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McKEE (T. J.). **A New Zealander tells how agriculture 'down under' uses colloidal sulphur suspension.**—*Agric. Chemicals*, 5, 6, pp. 42, 43, 45, 87–90, 2 figs., 1950.

In New Zealand most apple-growers spray against apple diseases, especially scab and powdery mildew [*Venturia inaequalis* and *Podosphaera leucotricha*], with Bordeaux mixture at green tip, weak lime-sulphur from open cluster to pink stages, and colloidal sulphur (alone or with weak lime-sulphur) [*R.A.M.*, 19, p. 644] in combination with compatible insecticides for subsequent sprays. Dusting is not practised. Usually scab infection is reduced to the commercially acceptable level of 5 per cent. on the more susceptible varieties.

In 1937 the manufacture of colloidal sulphur was started in New Zealand by Fruitgrowers Chemical Co., Ltd., at Port Mapua, and since 1941 this plant has supplied almost the entire New Zealand market. Sold under the trade name 'colsul', the New Zealand product is a viscous, easily miscible, white paste formulated with a wetting agent and a small amount of suspending agent. On dilution it forms a milky suspension which is highly stable and requires many days before it settles completely. That sulphur toxicity is increased by reduced particle size [ibid., 22, p. 486 *et passim*] appears to have been confirmed by New Zealand growers over many years and in widely different climatic conditions. Since the product was generally adopted probably 30 million bushels of apples have been protected with locally manufactured colloidal sulphur as the chief elemental sulphur specific in the scab control programme.

MANTEN (A.), KLÖPPING (H. L.), & VAN DER KERK (G. J. M.). **Investigations on organic fungicides. III. The influence of essential trace metals upon the fungitoxicity of tetramethylthiuram disulphide and 8-hydroxyquinoline.**—*Antonie van Leeuwenhoek J. Microbiol. Serol.*, 17, 1, pp. 58–68, 1 fig., 1951.

It has been suggested that the antifungal activity of dithiocarbamates and 8-hydroxyquinoline [*R.A.M.*, 28, pp. 74, 181, 344] may be due to the precipitation or chelation of essential metallic constituents in the substratum and in the mould. Thus growth is prevented by rendering impossible the production of essential enzyme systems containing these elements. The influence of traces of iron, zinc, copper, manganese (added as sulphate), and molybdenum (as ammonium molybdate) upon the toxicity of tetramethylthiuramdisulphide [thiram] and of 8-hydroxyquinoline was investigated using *Aspergillus niger* [ibid., 29, p. 171] as a test organism. None of the metals reversed the toxicity of thiram either when the mould was very sensitive, as on a Czapek-Dox agar (0·1 p.p.m. inhibited fungal growth), or when it was resistant, as on malt agar (10 p.p.m. required). Only iron and cobalt counteracted the antifungal activity of 8-hydroxyquinoline, and the former did so only when the mould was in a resistant state on malt agar. Apparently on malt agar the compound formed between the iron and the fungicide was not sufficiently soluble to cause inhibition. Iron 8-hydroxyquinolinate itself was highly toxic to *A. niger* on Czapek-Dox agar (0·2 p.p.m.), but not on malt.

Most phenomena encountered in the reversal of toxic action of antimicrobial agents by addition of heavy metal ions may be satisfactorily explained by the availability factor. The antifungal activity of the two substances investigated could not be attributed to their capacity for precipitating heavy metals.

HALLECK (F. E.) & COCHRANE (V. W.). **The effect of fungistatic agents on the bacterial flora of the rhizosphere.**—*Phytopathology*, 40, 8, pp. 715–718, 1950.

The results of preliminary studies at the Wesleyan University, Middletown, Connecticut, on the effect on the bacterial flora of the rhizosphere of fungistatic compounds applied to the leaves of bean [*Phaseolus vulgaris*] plants demonstrated a reduction in the relative numbers under the influence of Bordeaux mixture (0·2 gm. metallic copper per l.), malachite green [*R.A.M.*, 29, p. 583] (5 gm.), and dithane Z-78 (1·88 gm.). Thus, the ratios of bacteria in the rhizosphere to those in soil not penetrated by the bean roots were 9·7, 6·9, and 29·8, respectively, for the three toxicants, as compared with 20·3, 10·6, and 46·5, respectively, for untreated plants, representing percentage changes of —52·2, —34·9, and —35·9, respectively. Possibly the chemicals, or fragments or breakdown products thereof, are translocated to the roots and lost to the soil solution in amounts inhibitory to some bacteria.

On the other hand, spergon (1·31 gm.), phygon-XL (1·77 gm.), cetyltrimethylammonium bromide (0·1 gm.), tetramethylammonium bromide (0·5 gm.), and proflavine (0·02 gm.) increase the bacterial population of the rhizosphere in varying degrees. For instance, in pots treated with spergon, phygon-XL, and proflavine, the ratios of rhizosphere to non-rhizosphere soil bacteria were 12, 14·9, and 8·8, as against 3·6, 3·6, and 5, respectively, in the untreated, equivalent to percentage changes of +233·3, +313·9, and +154·5, respectively.

It is postulated that the chemicals may cause some injury to the plant, resulting in increased excretion by the roots of compounds which serve as nutrients for rhizosphere bacteria.

JENNY (J.). **Nouvelle étape dans le développement de la lutte antiparasitaire en agriculture.** [A new stage in the development of antiparasitic measures in agriculture.]—*Rev. romande Agric., Vitic., Arboric.*, 6, 6, pp. 45–48, 5 figs., 1950.

The author discusses the use of helicopters and mechanical atomizers in the control of plant parasites, with special reference to conditions existing in Switzerland. Atomizers use more benzene than motor pumps (up to 12 l. per hour plus that used by the tractor), but they do much more work and use much less liquid per surface area treated. Their liquid capacity is 100 to 500 l., as against up to 2,000 l. or more for ordinary sprayers. They can be used also for dry and wet dusting. A description is given of the Borchers apparatus, which can be mounted on a jeep or tractor. This machine gives an even finer spray than an atomizer and uses less fluid. Treatments must be effected in the absence of sun, and in calm weather or when the mist is carried to the plants by a light breeze. The solvent evaporates and the active principle remains as a deposit on the leaves. Some of the nozzles move through 180°, delivering the fungicide in any desired direction in a band 50 m. wide. Using this machine, the author treated 2·5 ha. of orchard trees in a plot 250 by 100 m. with 10 l. of liquid in less than 15 minutes. A rate of treatment of at least 1·8 km. per hour is possible.

TITZCK (W.). **Beziehungen von Klima und Witterung zur Häufigkeit der Pflanzenkrankheiten in Schleswig-Holstein.** [Relations of climate and weather to the frequency of plant diseases in Schleswig-Holstein.]—*Kühn-Arch.*, 54, pp. 404–430, 2 graphs, 5 maps, 1940. [Received November, 1950.]

This is a compilation and discussion of records from the literature dealing with the

relation of climatic and meteorological influences to the frequency of plant diseases [*R.A.M.*, 29, p. 317] in Schleswig-Holstein. The local climate tends to increase the incidence of fungal diseases propagated by the conidia and mycelium rather than that of those disseminated by [resting] spores.

Papers presented at the New York symposium on the teaching of plant pathology.—*Plant Dis. Reptr*, 34, 9, pp. 272–288, 1950. [Multilithed.]

At a symposium on the teaching of plant pathology, held in New York in December, 1949, by the American Phytopathological Society [cf. *R.A.M.*, 29, p. 471], papers on various aspects of the subject by H. W. Anderson, T. Sproston, G. W. Fischer, L. M. Massey, R. Nelson, J. C. Walker, H. C. Young, R. S. Kirby, and G. F. Weber were read.

Drummond (O. A.). **Um metodo simples e eficiente para o estudo de fungicidas para pulverizações preventivas em folhas.** [A simple and efficient method for the study of fungicides for preventive sprays on leaves.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 57–59, 1 pl., 1949. [English summary.]

In this paper, presented at the Second South American Congress of Botany on 15th October, 1948, the author describes a simple and effective technique for the assay of fungicides as protective foliage sprays. Tomato seedlings of the small-fruited Japanese variety, 15 to 20 cm. high, in boxes (six per box, 10 cm. apart), are sprayed with the fungicides, Bordeaux mixture 1–1–100 being used as a standard of comparison. About ten minutes later the seedlings are inoculated with a conidial suspension of the test fungus, *Septoria lycopersici*, and transferred to a moist chamber for eight to ten days. The lesions on the three basal leaves of each plant are then counted, an easy matter since they are well defined and never exceed 1·5 cm. in diameter. On untreated plants there will be 200 to 600 lesions per plant, whereas on Bordeaux treated seedlings the number seldom exceeds 30 and is often below 10.

Moreau (C.). **Les maladies parasitaires des principales cultures coloniales. Revue bibliographique. V.** [The parasitic diseases of the principal colonial crops. Bibliographical review. V.]—*Rev. Mycologie, Suppl. colon.*, 15, 1, pp. 61–72, 1950.

This fifth review [cf. *R.A.M.*, 29, p. 371] includes further notes on crop diseases compiled from the literature (66 titles) published from 1946 to 1950.

Limasset (P.) & Darpoux (H.). **Principes de la lutte contre les maladies cryptogamiques.** [Principles of the control of fungus diseases.]—Reprinted from *Bull. tech. Inform. Ingén. Serv. agric.* 49, 5 pp., 1950.

After a general discussion of host-parasite relationships the authors give examples of certain diseases and their control by the disinfection of the soil, seed, tubers, bulbs, cuttings, storage sheds, and fruit; by external spraying or dusting of the aerial organs; and by internal chemotherapeutic treatment [*R.A.M.*, 30, p. 54].

Aiyer (A. K. Y. N.). **Mixed cropping in India.**—*Indian J. agric. Sci.*, 19, 4, pp. 439–543, 8 figs., 1949. [Received January, 1951.]

In the section of this paper dealing with plant diseases the author points out that an immune crop or an immune variety of the same crop interposed in rows or broadcast in a susceptible crop not only breaks or checks the progress of a disease but reduces loss to an extent proportional to the ratio of the immune mixture. Amid ordinary coffee (*Coffea arabica*) badly attacked by red leaf disease [*Hemileia vastatrix*: *R.A.M.*, 29, p. 210] may be seen bushes, said to be hybrid or other strains, which stand out with a good leaf cover. A mixed crop of low growth habit among

a taller crop reduces diseases to which the latter may be subject by reducing soil temperature near the surface. Growing a mixed crop of *Phaseolus aconitifolius* with cotton reduced mortality of the cotton from root rot [? *Fusarium* sp. and *Macrophomina phaseoli*: ibid., 24, p. 228]. This effect was more marked in *Gossypium hirsutum* than in *G. arboreum*. Experimental evidence indicated that incidence of red leaf [ibid., 28, p. 15] and leaf roll [? leaf curl: ibid., 29, p. 507], to which American cotton is much subject, is distinctly less when the two species are grown together. *G. arboreum* is susceptible to *Fusarium* wilt [*F. vasinfectum*], but receives some protection from it when grown in association with American cotton, which is immune. The final yields of the mixture were equal to or even greater than those of the single type, according to the season. Similar protection has been reported for jowar [sorghum] among cotton, shade evidently being the principal factor, whether provided by a short or tall crop

Whether reduced temperature and increased humidity near the soil surface induced by this means are always beneficial may be doubted. Pink disease (*Corticium salmonicolor*) of rubber, for example, is favoured by shade. Where artificial or natural mixtures of plants which are hosts of any disease are present, the mixture hinders disease control and helps the spread and perpetuation of infection. Species of *Oidium* attacking Cruciferae [*Erysiphe polygoni*] find a mixed crop or weeds of the same family favourable for spread over the whole field. The presence of sandal or *Colocasia* spp. helps to spread koleroga disease (*Phytophthora arecae*) of areca nut [ibid., 26, p. 103]. Other examples are cited.

Baker (K. F.) & Snyder (W. C.). **Plant diseases. Restrictive effect of California climate on some vegetable, flower, grain diseases.**—*Calif. Agric.*, 8, 4, pp. 15–16, 3 figs., 1950.

Among the important plant diseases which are unknown in California owing to the semi-arid climate [cf. *R.A.M.*, 26, pp. 475, 476] are black rot of cabbage and cauliflower [*Xanthomonas campestris*], *Septoria* leaf spot of tomato [*S. lycopersici*], watermelon anthracnose [*Colletotrichum lagenarium*], and angular leaf spot [*Pseudomonas lacrymans*] and scab [*Cladosporium cucumerinum*] of cucumber. Loose smut of wheat [*Ustilago tritici*], destructive in humid areas, is essentially unknown and farmers are saved the cost of the hot-water seed treatment necessary for its control.

Growers are advised to exploit their climate by selecting the area and the season that will be most effective in reducing crop losses.

Seeds. Report of the Committee on qualitative control of seeds.—30 pp., London, H.M. Stationery Office, 1950. 1*s*.

In this report, section III (pp. 8–12) deals with the incidence and control of seed-borne diseases in the British Isles and a report of an *ad hoc* committee appointed to consider the subject (W. C. Moore, C. C. Brett, F. Joan Moore, A. E. Muskett, and Mary Noble) is given. Seed-borne diseases which may reduce food production are listed. It is suggested that section 1 (1), lines 5–7, of the Seeds Act, 1920, be amended to read '. . . the prescribed particulars with respect, in the case of seeds, to their variety, purity, germination, and infection with harmful seed-borne organisms, . . .'. Seed-testing practice should be extended to cover health, but the task demands a specialist staff. There is need for suitable, rapid, accurate examining techniques, and further research into methods is urgently needed. Test methods and seed surveys should be extended to investigate the pathogens listed, particularly those of wheat and barley. Surveys of imported seed could yield information on which to base action to exclude foreign seed-borne organisms. A promising line of approach to the production of healthy seed would be to co-ordinate and extend inspections for disease in the existing crop certification schemes;

this should be done first for loose smut of wheat, barley, and oats (*Ustilago tritici*, *U. nuda*, and *U. avenae*). There is urgent need to deal with lettuce mosaic [virus: *R.A.M.*, 28, p. 110; 29, p. 198] and mosaic [virus: loc. cit.] of bean [*Phaseolus vulgaris*].

These proposals, if approved, should be developed and guided by a small committee drawn from the Seed Testing Stations and the Plant Pathology Service.

Moreau (C.). **Les mycocécidies des régions tropicales.** [Mycocecidia in the tropics.] —*Rev. Mycologie, Suppl. colon.*, 15, 1, pp. 1–44, 6 figs., 1950.

The author discusses definitions of the term plant gall [cf. *R.A.M.*, 29, p. 632] and reviews, mainly from the literature, the different types of fungal plant galls encountered in the tropics, following a systematic order. A comprehensive bibliography on this subject is appended.

Zambettakis (C.). **Lasiodiplodia theobromae (Pat.) Griff. et Maubl. Pourriture noire des plantes tropicales.—Die back.** [*Lasiodiplodia theobromae* (Pat.) Griff. & Maubl. Black rot of tropical plants.—Die-back.]—*Rev. Mycologie, Suppl. colon.*, 15, 1, *Suppl.* 1, 7 pp., 3 figs., 1950.

The author gives an account of *Lasiodiplodia* (*Botryodiplodia*) *theobromae*, and the black rot or die-back diseases it causes in tropical plants, including the mode of penetration and infection of banana [*R.A.M.*, 18, p. 41], tea [ibid., 27, p. 260], and cacao pods [ibid., 29, p. 356], transmission, characters of the fungus, and preventive measures [ibid., 20, p. 128] for the principal crops attacked. These last include the maintenance of a state of nutrition and regular plant activity for suitable yield and growth, which encourages resistance under all climatic conditions. For tea, light, frequent pruning is recommended. Regular irrigation should be practised and there should be sufficient and continuous shade from large trees resistant to the disease to prevent scorching of the bark. Plants growing at high altitudes are generally more resistant than those at lower levels. Aerating the soil and increasing its water capacity are also advised. All visibly affected parts or tissues should be removed and the wounds disinfected and covered with paraffin. Whitewashing the stems prevents invasion by reducing the temperature from 60° to 42° C. [cf. ibid., 30, p. 4]. Foliage should be treated with 2 per cent. Bordeaux mixture.

Citrus fruits should be preserved with borax and the period of transportation of bananas should be reduced, a stable temperature being maintained in the warehouse, and the ends of the bunches cut and coated with vaseline. Recent experiments have shown phygon, fermate, and zerlate to be effective in destroying the spores of this fungus. The addition of lime and potassium nitrate (75 gm. per plant) or various potassium salts or wood ash prevent the extension of symptoms. On the other hand excessive applications of phosphoric acid increases susceptibility, the presence in the soil of marine salts is very injurious and sandy soils encourage spread.

Basu (S. N.) & Ghose (S. N.). **The role of dark-coloured fungi in the microbiological deterioration of sun-exposed Jute fabric.**—*Sci. & Cult.*, 15, pp. 285–286, 2 figs., 1950.

To test the hypothesis that dark-coloured or thick-walled fungi preponderate on fabrics exposed to the sun [cf. *R.A.M.*, 28, pp. 23, 584; 30, p. 61], the authors, working at the Indian Jute Mills Association Research Institute, Calcutta, incubated one of two identical portions of jute hessian over water in the laboratory in semi-darkness [cf. ibid., 30, p. 39] and exposed the other to the sun on the roof from 9th August to 17th October. On agar plates of the indoor sample the predominant fungi were *Aspergillus niger*, *Paecilomyces varioti*, and *Penicillium*

luteum, which made heavy growth, and *A. terreus* (moderate growth). The plates from the outdoor sample developed heavy growths of *Curvularia lunata* and a species of *Alternaria*, and slight growth of *Aspergillus niger*. Growth in the shade was thus confined to species with hyaline hyphae. It would appear that normally the Dematiaceae are suppressed by the competitive growth of other fungi, but in sunlight those with pale or hyaline hyphae are killed or inhibited, whereas those with dark hyphae survive, the pigment probably protecting them from the ultra-violet rays.

VERONA (O.). **Microbiologia delle fermentazioni e microbiologia industriale.** [The microbiology of fermentations and industrial microbiology.]—xiii+1,022 pp., 295 figs., 76 graphs, 22 diags., Firenze, Casa ed. Dr. Luigi Macrì, 1950. Lire 8,000.

In this comprehensive, copiously illustrated work the author deals with industrial fermentation from a microbiological point of view. In the first part (pp. 1–254) a historical review of the subject is given, followed by chapters on the Schizomycetes, yeasts, Eumycetes, enzymes, and the general technique of studying micro-organisms. The second part (pp. 257–479) deals with the chemical aspect of fermentation and its causal agents (fermentation of proteins, and complex carbohydrates, microbial breakdown of pectins, chitin, and glucosides, fermentation and non-alcoholic fermentation (anaerobic and aerobic), of glucides, microbial action on hydrocarbons, acids, alcohol, and lipides, and oxidization and reduction of mineral salts. This part also deals with the biological manufacture of citric acid, butyl alcohol, acetone, etc. The third part (pp. 483–972) deals with the chief industrial processes into which microbial activity enters, the subjects including, among others, drinking-water, ethyl alcohol, brewing, wine-making [see below, p. 184], milk, butter, cheese, sugar, paper, and the preservation of food.

MANDELS (G. R.) & SIU (R. G. H.). **Rapid assay for growth: determination of microbiological susceptibility and fungistatic activity.**—*J. Bact.*, 60, 3, pp. 249–262, 1 fig., 11 graphs, 1950.

A description is given of a rapid, reliable manometric method developed at the Quartermaster-General Laboratories, Philadelphia, for determining the susceptibility of treated cotton, plastics, leather, wool, and other materials to attack by micro-organisms, the fungistatic and bacteriostatic activity of compounds, and with simple modification, germicidal properties. It is based upon growth determination as measured by oxygen consumption, and permits satisfactory measurements in 24 or 48 hours. The manometer is constructed of capillary tubing of 2-mm. bore and 200 to 300 mm. long. The manometers are filled with Brodie's solution and mounted vertically in an incubator maintained at 30° C. To absorb carbon dioxide a small cup containing 1·5 ml. 10 per cent. potassium hydroxide with a filter-paper wick is suspended from a hook inside the connector to the experimental flask by a nichrome wire. In most of the work *Myrothecium verrucaria* was used. Cultures were prepared by adding 50 ml. of nutrient agar to 250-ml. flasks. Disks 7 cm. in diameter of the material under test plus 1 ml. of standard spore suspension were placed in one flask, another acting as control. Both are attached to the manometer in the incubator, and when they attain temperature equilibrium (in a few hours) the stopcocks are closed. The pressure difference between the two flasks is measured in mm. at suitable intervals. The linear growth rate of *M. verrucaria* at different concentrations of 2,2'-dihydroxy-5,5'-dichlorodiphenyl methane paralleled respiration. On khaki twill containing varying concentrations of copper naphthenate there was also a linear relation between the respiration during the first 48 hours and the log of the copper content of the cloth. Very little respiration occurred at 0·11 per cent. copper. The breaking strength measurements of the

cloth harvested after seven days' incubation gave a similar picture. The correlation between respiration during 48 hours and the susceptibility of the treated fabrics as determined by breaking strength data was very good.

AMES (L. M.). **New species of cellulose decomposing fungi. II.**—*Mycologia*, 42, 5, pp. 642–645, 13 figs., 1950.

Three new species of *Chaetomium* [*R.A.M.*, 29, pp. 323, 537, 585] are described. *C. fibripilium* isolated from sugar-cane collected in the Hawaiian Islands is greenish yellow to yellowish brown. The perithecia are subglobose or ovate with bluntly pointed bases, 260 by 230 (200 to 330 by 185 to 285) μ, supported by delicate rhizoids, occasionally producing cirrhi. The numerous, lateral and terminal, septate hairs are greenish yellow, browning with age, the terminal ones forming a large bushy head, many being compositely branched. The asci are club-shaped and fugaceous; the ascopores are dilute green when young and when mature dilute brown, ovate, slightly apiculate at one end, round at the other, and 10 by 8 (9·5 to 11·25 by 7 to 8·5) μ.

C. mollipilium from a Japanese raincoat is pale brown to cream coloured; the perithecia are 175 by 130 (165 to 240 by 130 to 190) μ, supported by light brown rhizoids, and have cirrhi. There is a moderate number of lateral hairs and the terminal hairs are sparse, often branched at wide angles. The asci are clavate, 38 by 12·5 μ, spore part 27 μ. The mature ascospores are lemon-shaped, apiculate, and 12 by 10 (10 to 12·25 by 8·5 to 10) μ.

C. nigricolor from India is black; the perithecia, 250 by 230 (200 to 285 by 190 to 260) μ, have brown rhizoids, but seldom cirrhi. The bushy, hairy heads have a ragged appearance. The black lateral hairs are moderately numerous, obscurely septate, roughened, and straight or undulating. The terminal hairs are numerous, black, covered with black projections and undulating or with occasional spiral coils. The asci are fugaceous, club-shaped, 25 by 9 μ, spore part 14 μ. The mature ascospores are brown, almond-shaped, slightly apiculate at one end, and 5 to 6 by 4 to 5 μ.

BARAIL (L. C.). **Preparation and testing of mold-resistant wrapping papers.**—*Tappi* (Tech. Ass. Pulp Pap. Ind.), 33, 7, pp. 349–352, 1950.

Over 400 compounds were tested for the control of moulds on wrapping papers at the United States Testing Company, Hoboken, New Jersey, by a method which is fully described, *Chaetomium globosum* and *Aspergillus niger* being generally used as the test organisms. Very few gave entirely satisfactory results, but chlorine derivatives are very effective when incorporated into the pulp. Where there is no objection to odour, pentachlorophenol and sodium pentachlorophenate can also be recommended, while copper compounds may be used if changes in the colour of the product are immaterial. However, these two groups of chemicals are relatively toxic. The most efficient preparations are long-chain mercurials, which at normal concentrations combine permanence with absence of toxic and irritating properties.

WOLF (P. A.). **Dehydroacetic acid : a new microbiological inhibitor.**—*Food Tech.*, 4, 7, pp. 294–297, 8 figs., 1950.

Among the organisms used in preliminary screening tests with dehydroacetic acid (DHA) at the Biochemical Research Laboratory, The Dow Chemical Company, Midland, Michigan, were *Sclerotium rolfsii*, *Phomopsis* [*Diaporthe*] *citri*, *Erwinia carotovora*, *Penicillium digitatum*, *Rhizopus nigricans* [*R. stolonifer*], and *Aspergillus niger* [*R.A.M.*, 30, p. 175]. The results justified further experiments, in which the compound or its sodium salt (DHA–S) proved effective in the control of [unspecified] bread and cheese moulds [ibid., 27, p. 250 *et passim*], *Penicillium expansum* in butter [ibid., 25, p. 174], and [unspecified] moulds of dried fruits, such as prunes,

peaches, and apricots [cf. ibid., 27, p. 251]. In one series of tests the concentrations of the compound inhibiting the growth of *A. niger*, *P. digitatum*, *P. expansum*, *R. stolonifer*, *Trichophyton mentagrophytes*, and *T. interdigitale* were 0·05, 0·03, 0·01, 0·05, 0·005, and 0·005 per cent., respectively.

DARPOUX (H.) & FAIVRE-AMIOT (A.). **Recherches sur les antagonismes microbiens et sur les substances antibiotiques. Essais d'application dans la lutte contre les maladies des plantes.** [Researches on microbial antagonism and antibiotic substances. Experiments on their application in the control of plant diseases.] —*Rev. Path. vég.*, 29, 1–2, pp. 102–114, 2 pl., 1950.

Most of the information in this paper has been noticed from other sources [cf. *R.A.M.*, 29, p. 575; 30, p. 58]. A list is given of the organisms which produce antibiotic substances and of the pathogenic bacteria and fungi against which some of these are active.

PERLMAN (D.). **Some mycological aspects of penicillin production.**—*Bot. Rev.*, 16, 9, pp. 449–523, 1 fig., 1 diag., 5 graphs, 1950.

In this paper the author reviews and discusses the literature (279 titles) available up to December, 1949, on the mycological aspects of penicillin production.

PHILLIPS (G. B.) & HANEL (E.). **Control of mold contaminants on solid media by the use of actidione.**—*J. Bact.*, 60, 1, pp. 104–105, 1950.

Effective control of yeasts and moulds contaminating agar plates was obtained by the addition to the culture medium of actidione [*R.A.M.*, 29, p. 473] at a concentration of 0·1 mg. per ml.

VOETS (J.). **Sur l'action anti-microbienne des détergents.** [On the anti-microbial action of detergents.]—*Parasitica*, 6, 3, pp. 98–106, 1950.

The author reviews and discusses recent literature (31 titles) dealing with the anti-bacterial action of detergents.

SCHANDERL (H.). **Die Microbiologie des Weines.** [The microbiology of wine.]— 211 pp., 50 figs., 1 diag., 56 graphs, 1 map, Ludwigsburg, Eugen Ulmer, 1950. DM. 12.

The largest section of this useful manual (Volume II of the 'Handbuch der Kellerwirtschaft') deals with the morphology, biology, and systematics of the microflora of fruits, musts, and wines and comprises, *inter alia*, information on the yeast and mould contaminants of wine [cf. *R.A.M.*, 5, p. 568, and above, p. 182].

STOLL (K.). **Über Sporenkeimprüfungen in geschlossenen Pflanzenbeständen.** [On spore germination tests in closed plant stands.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 2, 7–8, pp. 118–120, 1948. [Received June, 1950.]

As part of the investigations carried out by the Aschersleben [Saxony] branch of the Biological Institute into the importance of bioclimatic factors in the spread of plant diseases, the behaviour of spores of *Ascochyta pisi* [*R.A.M.*, 20, p. 509] and *A. pinodella* [ibid., 30, p. 93] was examined in closed stands in the summer of 1947. Plots were selected with similar bioclimates, during the incubation period, to those of the coastal districts where the diseases are most serious. The spores were placed directly on broad bean leaves as pea leaves proved unsatisfactory for the later examination of the epidermis. In saturated air 100 per cent. germination may occur after 10 hours, but because the humidity on the leaf surface fluctuates this was attained only in exceptional cases. Under natural conditions the behaviour of the spores varies. The shape may remain unchanged for many days, or the spore may swell as it takes up water, reaching sometimes double its

size, the bicellular spores of *A. pisi* becoming markedly constricted at the septum. Usually no germination takes place except in a humidity chamber. The spores sometimes shrivel and the shape is only partially restored by wetting. These mostly do not germinate. When the spore germinates normally it forms, according to the humidity conditions, either a short germ-tube with a terminal appressorium if it contacts the leaf surface, or a much longer hypha which is unable to form an appressorium without the contact stimulus.

Chowdhury (H. P.) & Kamal (M.). **Effect of β-indol-3-acetic acid, phenoxy acetic acid and β-naphthoxy acetic acid on growth of Alternaria tenuis.**—*Curr. Sci.*, 19, 8, pp. 247–248, 2 graphs, 1950.

At Lucknow University, using a slightly modified form of the technique prescribed by Richards in *Bot. Gaz.*, 110, pp. 523–550, 1949, the writers tested the effect of β-indole-3-acetic acid, phenoxyacetic acid, and β-naphthoxyacetic acid at concentrations ranging from 0·0001 to 0·1 per cent. in 50 per cent. acetone on the growth of *Alternaria tenuis* isolated from *Pandanus fascicularis* [*P. tectorius*: *R.A.M.*, 29, p. 469] on a synthetic medium at 28° to 30° C. Inhibition by β-indole-3-acetic acid and by phenoxyacetic acid occurred at 0·01, 0·05, and 0·1 per cent., while the two lowest concentrations of the former (0·001 and 0·0001) stimulated the development of the fungus, which was scarcely affected by the latter at 0·001 but enhanced at 0·0001 per cent. All concentrations of naphthoxyacetic acid arrested the growth of the pathogen except the minimum, which exerted no effect. Apart from a faint lightening of the pigmentation of the cultures, the morphology of the fungus remained essentially unchanged by the growth regulators.

Hawker (Lilian E.). **Physiology of fungi.**—xvi+360 pp., 5 pl., 11 figs., 15 diags., 12 graphs, University of London Press Ltd., 1950. 21*s*.

This outline of the physiology of fungi, with particular emphasis on those aspects peculiar to the group, is intended primarily for university students and mycological research workers. It should, however, be helpful also to workers in the agricultural, industrial, and medical branches of applied mycology, in which such immense advances have been made of recent years. Chapter (1) is an introductory account of the typical life-cycle of fungi, while the other chapters deal, respectively, with (2) growth and variation; (3) nutrition; (4) respiration, fermentation, and metabolic products; (5) the effect of nutrition on sporulation; (6) other environmental factors influencing growth and sporulation; (7) factors influencing the survival and germination of spores; and (8) interaction with other organisms. The bibliography of 835 titles is supplemented by lists of books and reviews at the ends of some of the chapters. An index to genera of fungi and lichens and a general index are appended.

Tandon (M. P.). **Sulphur requirement of Pestalotia malorum and Pestalotia psidii.**—*Proc. Indian Acad. Sci.*, Sect. B, 32, 1, pp. 7–11, 1950.

Pestalotia malorum and *P. psidii*, isolated on oatmeal agar from rotten apples [*R.A.M.*, 13, p. 493] and mummified guavas [ibid., 28, p. 608; 29, p. 89], respectively, at the University of Allahabad, failed to grow in the absence of sulphur. They attained their maximum development with the addition of magnesium and potassium sulphates and cysteine at rates calculated to furnish 0·665 gm. sulphur per l. of nutrient solution. Thiourea at the same rate permitted moderate growth.

Hirata (S.). **Diagnostic value of the iodine method and the phenol method for virus-infected Potato tubers.**—*Ann. phytopath. Soc. Japan*, 14, 1–2, pp. 25–28, 1950. [Japanese, with English summary.]

In a modification of the iodine method for diagnosing virus diseases in potato plants [*R.A.M.*, 16, p. 706], a mixture of 0·5 ml. potato juice, 0·5 ml. starch

paste (1·5 gm. to 100 ml. distilled water), and 1 to 5 ml. iodine solution (2 gm. in 100 ml. 30 per cent. ethyl alcohol) was kept at about 30° C. The juice from tubers infected with [unspecified] virus faded within 50 minutes, while that from healthy tubers took more than three hours to fade. The diagnostic accuracy of this test was about 70 per cent. when 74 tubers of the Benimaru variety were tested immediately after harvest, and much lower when the tubers had sprouted.

Using 1 ml. potato juice and 0·2 ml. of 0·1 per cent. phenol solution [ibid., 20, p. 75] at room temperature, the juice from healthy tubers turned dark brown in five hours, while that from diseased tubers turned whitish-yellow. The same reactions were observed with tuber slices sprinkled with phenol. The diagnostic accuracy of this method, however, was very low.

Kassanis (B.). **Heat inactivation of leaf-roll virus in Potato tubers.**—*Ann. appl. Biol.*, 37, 3, pp. 339–341, 1950.

The information in this paper has been noticed from another source [*R.A.M.*, 29, p. 168]. Heat treatment failed to eliminate potato virus Y from tubers.

Köhler (E.) & Hauschild (Irmgard). **Versuche zur Beeinflussung blattrollkranker Kartoffelknollen durch Chemikalien.** [Experiments on the action of chemicals on leaf roll diseased Potato tubers.]—*NachrBl. dtsch. PflSchDienst, (Braunschw.)*, 2, 2, pp. 24–26, 1950.

The authors' experiments in the therapy of potato leaf roll by chemical treatment of the tubers on the lines suggested by Rippel [*R.A.M.*, 29, p. 378], using sodium sulphide, potassium hydroxide, potassium permanganate, and ascorbic acid, with cane sugar as a control, proved the process to be uniformly unsuccessful.

Broadbent (L.), Chaudhuri (R. P.), & Kapica (L.). **The spread of virus diseases to single Potato plants by winged aphids.**—*Ann. appl. Biol.*, 37, 3, pp. 355–362, 1950.

Young King Edward potato plants in pots were exposed in the open near potato plots for limited periods at intervals during the summers of 1944 to 1946 at Rothamsted Experimental Station, Harpenden. They became infested with large numbers of alate aphids only during warm, calm, and dry weather. Only 2 to 4 per cent. of potted plants became infected with potato virus Y or potato leaf roll virus [*R.A.M.*, 29, p. 379] in May or June when 30 to 40 per cent. of the total spread of disease occurred in the Majestic main crop, but most did so in July when alate aphids were leaving neighbouring potato crops. Few apterous aphids reached the plants from potatoes three yards away or from nearby infested cruciferous weeds. Widely different proportions of the exposed plants became infected in different years and in 1944 and 1945 many more plants were infected with virus Y than with leaf roll.

Kozłowska (A[niela]). **Investigations on the strains of Potato virus X in ultra violet light.**—*Bull. int. Acad. Cracovie*, 7, pp. 215–232, 1 pl., 1950.

In experiments carried out at Jagiellonian University, Cracow, virulent strains of potato virus X [*R.A.M.*, 29, p. 378] in young leaves of White Burley tobacco consistently caused a characteristic fluorescence in ultra-violet light [ibid., 27, p. 34]. Fluorescence of leaves infected with masked virus X, however, varied from none to a distinct illumination along the entire length of the veins. It developed usually on the second or third day after inoculation before the virus could be detected serologically, but its appearance could be delayed or absent. The phenomenon appears to be associated with the disease complex and apparently is not solely a direct fluorescence of the virus nucleoprotein. This was indicated by the fact that extracts of the latter caused no fluorescence, which appeared distinctly

only on infected tobacco and not on other infected hosts. It was not correlated directly with the intensity of the disease; it appeared in the first month after infection, disappearing in the later stages, although the virus was still present. Since fluorescence of tobacco leaves may also develop as a result of other factors such as contact with the soil microflora or decomposition of organic substances on yellowing through age, it is suggested that certain compounds are probably present in the sieve tubes, which may cause fluorescence when influenced by virus X or other stimuli.

De Montgremier (H[élène] A.). **La dissémination du virus X (Marmor dubium (Orton) Holmes) dans les cultures de Pommes de terre. Étude sur le rôle du sectionnement des tubercules.** [The spread of virus X (*Marmor dubium* (Orton) Holmes) in Potato crops. Study on the part played by tuber cutting.]—*Ann. Épiphyt.*, Sér. C, 1, 1, pp. 38–47, 2 diags., 1950.

This information has already been noticed from another source [*R.A.M.*, 29, p. 225].

Rose (D. H.) & Cook (H. T.). **Handling, storage, transportation, and utilization of Potatoes.**—*Bibliogr. Bull. U.S. Dep. Agric.* 11, 163 pp., 1 graph, 1949. [Received January, 1951.]

This digest of information on the handling, storage, transportation, and utilization of potatoes published mostly from 1938 to 1948 is a report of a study made under the Research and Marketing Act of 1946. It includes information (pp. 31–34) on the use of potato vine killers in the United States [*R.A.M.*, 29, p. 380] and in England [ibid., 28, p. 479] and descriptions of the characteristics of the more important transit and storage diseases encountered and their methods of control (pp. 125–149). To the latter section a bibliography of 145 titles is appended.

Malmus (N.). **Die Bekämpfung der Kraut- und Knollenfäule der Kartoffel. Ergebnisse der im Jahre 1949 in Bayern durchgeführten Versuche.** [The control of Potato shoot and tuber blight. Results of the experiments carried out in 1949 in Bavaria.]—*Pflanzenschutz*, 2, 2, pp. 13–17, 1950.

A tabulated survey is given of the spraying experiments for the control of potato blight (*Phytophthora* [*infestans*: *R.A.M.*, 29, p. 227]) carried out in 1949 in different localities of Bavaria. In 297 experimental plots (72·5 per cent.) the copper sprays (copper-lime compounds with 16 to 18 per cent. and 45 per cent. copper) effected substantial increases in yield; in 86 (20·5 per cent.) the yields in the treated portions were lower than in the untreated; and in 29 (7 per cent.) there was no difference between the sprayed and unsprayed. The average increase in yield for all the 'positive' plots was computed at 8·4 per cent., these favourable results being obtained mostly in districts where the disease did not occur.

Andrén (F.). **Besprutningsförsök mot Potatisbladmögel 1949.** [Spraying experiments against Potato blight 1949.]—*Växtskyddsnotiser*, *Växtskyddsanst., Stockh., 1950*, 2, pp. 19–23, 2 figs., 1950.

Spraying experiments against potato blight [*Phytophthora infestans*] in two localities of Sweden [*R.A.M.*, 28, p. 191] were resumed in 1949, when the disease reached epiphytotic proportions in most parts of the country [ibid., 29, p. 428]. Incidence was assessed on a 10-grade scale, with 10 corresponding to complete shrivelling of the foliage, and storage rot on a percentage basis. At Nyckelby the best results were given by 3 and 1 per cent. Bordeaux mixture, closely followed by carsane powder, 2 per cent. cuzol, 1·5 per cent. usit, and Beckers Bordeaux dust. The total yields (in kg. per ha.) produced by the plots sprayed with these preparations, compared with 27·59 in the untreated controls, were 33·29, 33·07,

32·74, 31·86, 31·76, and 31·6, respectively; the blight values (control 10) were 3·5, 4·5, 5·2, 3·8, 3·4, and 1·6, respectively, and those for storage rot (control 8·8 per cent.) 0·7, 1·1, 1·9, 1·7, 2, and 0·5 per cent., respectively.

At Åkarp on 26th July the blight values for foliage infection on the plots sprayed with cuzol, 2 per cent. Bordeaux, and usit were 0·8, 0·8, and 1, compared with 2·2 in the controls, on 22nd August 2, 2·5, 4·2, and 7·8, respectively, and on 28th September 10 in all plots, the corresponding yields being 28·5, 28·09, and 27·94 and 22·79 kg. per ha., respectively.

Van Eek (T.) & Thung (T. H.). **Resultaten van onderzoekingen omtrent Aardappelziekten op Java.** [Results of investigations on Potato diseases in Java.]—*Landbouw*, 22, 7–9, pp. 303–346, 4 figs., 5 graphs, 1950. [English and Indonesian summaries.]

The information presented in this paper on potato slime disease (*Bacterium* [*Xanthomonas*] *solanacearum*) and blight (*Phytophthora* [*infestans*]) in Java has already been noticed from another source [*R.A.M.*, 27, p. 35].

The most important virus diseases prior to 1941 were leaf roll and rugose mosaic (virus Y), of which the latter is known to be transmissible by aphids. The possibility that other insects colonizing potato leaves, e.g., the widespread *Epilachna*, grasshoppers, and Thysanoptera, and *Pseudococcus hirsutus*, found on sprouting tubers, may be concerned in the spread of infection demands further investigation. The following were attacked by leaf roll in experimental plots: the wild species *Solanum demissum*, *S. caldasii*, *S. chacoënse*, and *S. neo-antipoviczii* and hybrids between various lines of *S. demissum* and Populair, Katahdin, Iduna, and Jubilee, *S. andigenum* [see next abstract] × Katahdin, Thorbecke, and Populair, *S. caldasii* × Alpha, Burbank, and Voran, *S. chacoënse* × Jubilee, *S. antipoviczii* × Populair, Java, and Sutton Flourball, (*S. demissum* × (*S. andigenum*) × Sutton Flourball, and Sutton Flourball × (*S. antipoviczii* × *S. chacoënse*).

Infection by virus Y was observed on *S. andigenum*, *S. antipoviczii*, *S. acaule*, *S. demissum*, *S. caldasii*, *S. chacoënse*; hybrids of *S. demissum* and Populair, Robijn, Jubilee, Iduna, Burbank, Neue Imperator, Katahdin, Deodora, and Argentina; hybrids between *S. caldasii* and Alpha, Roode Star, Robijn, Burbank, Thorbecke, and Populair; *S. antipoviczii* hybrids with Populair and Frühmölle (*S. chacoënse* × Alpha); and *S. andigenum* hybrids with Katahdin, Sutton Flourball, Thorbecke, and Populair.

César Vargas (C.). **Algunos resultados de investigaciones con Papas nativas peruanas.** [Some results of investigations with native Peruvian Potatoes.]—*Foll. misc. Ofic. Estud. esp. Méx.* 3, pp. 187–200, 1950.

In this paper, presented at the First Latin-American Conference of Phytogeneticists, held in Mexico City from 26th September to 8th October, 1949, the author describes the results of observations (including some of phytopathological interest) on potato cultures of successive series of clones collected from 1937 to 1948 in various localities of southern Peru. *Solanum juzepczukii*, *S. curtilobum*, and *S. andigenum* [*R.A.M.*, 27, p. 35; 30, p. 18, and preceding abstract] proved to be resistant to one or more of the pathogens attacking the crop, namely *Rhizoctonia* [*Corticium*] *solani* [ibid., 11, p. 226], *Synchytrium endobioticum* [ibid., 23, p. 316], *Alternaria solani*, and *Phytophthora infestans* [ibid., 30, p. 70], which assumes an epiphytotic form only in very humid seasons [ibid., 11, p. 225; 19, p. 265; 24, p. 286]. *S. stenotonum*, on the other hand, was highly susceptible.

Potatiskräftan i Sverige. [Potato wart disease in Sweden.]—*Flygbl. Växtskyddsanst., Stockh.*, 91, 2 figs., 1 map, 1950.

This is a summary of the essential information on the distribution, symptoms,

etiology, mode of spread, and control of potato wart disease (*Synchytrium endobioticum*) in Sweden [*R.A.M.*, 28, p. 191], together with a list of immune varieties [see next abstract and ibid., 30, p. 70].

Holmberg (C.). **Jämförande fältförsök med tidiga kräftimmuna Potatissorter.** [Comparative field experiments with early wart-immune Potato varieties.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1950*, 3, pp. 38–44, 1950.

A tabulated account is given of the performance of several early potato varieties immune from wart disease [*Synchytrium endobioticum*] in field experiments from 1943 to 1949 in different parts of Sweden [see preceding and next abstracts], using as standards of comparison the susceptible Early Puritan and Early Rose. The two most interesting immune varieties, Irish Cobbler and Dunbar Yeoman, outyielded the standards in some tests but failed to equal them in others. The average yields in trials from 1943 to 1946 on heavy clay soil at the Plant Protection Institute, Stockholm, were as follows (in kg. per linear m.): Irish Cobbler 8·7, Dunbar Yeoman 8·8, Early Rose 8·1, and Early Puritan 9·4. However, on the light, dry, sandy soil of Halland, both immune varieties excelled Early Rose, the yields of Irish Cobbler in four tests ranging from 5·7 to 8·9 and those of Dunbar Yeoman from 4·7 to 9·1, as against 4·4 to 6·3 for Early Rose. The new immune variety, Eva [*R.A.M.*, 29, p. 474], proved equal or superior to Early Puritan in 1948 and 1949.

Lindfors (T.). **Aggressiva raser av Potatiskräftsvampen.** [Agressive races of the Potato wart fungus.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1950*, 2, pp. 17–18, 1950.

Commenting on the development in Germany and Czechoslovakia of biotypes of *Synchytrium endobioticum* capable of attacking the ordinarily immune potato varieties [*R.A.M.*, 29, p. 529], the writer considers the existence of such physiologic races in Sweden to be improbable. Inoculation experiments with collections of the pathogen from 16 infested areas gave almost entirely negative results on the immune varieties [see preceding abstracts].

Busch (L. V.) & Gilpatrick (J. D.). **A possible quick method for testing the virulence of Streptomyces scabies (Thaxt.) Waksman & Henrici.**—*Plant Dis. Reptr*, 34, 9, p. 256, 1 fig., 1950. [Multilithed.]

In the autumn of 1949 at the Ontario Agricultural College, Guelph, potato plant cuttings inserted in moistened vermiculite developed small tubers at the lowest bud. They formed on 90 per cent. of cuttings 4 to 5 in. long cut immediately below a bud, and averaged ½ in. in diameter after three weeks, continuing to expand up to 1 in. in diameter. In one test cuttings with small tubers were transplanted into soil naturally infested with scab (*Streptomyces* [*Actinomyces*] *scabies*) [*R.A.M.*, 29, p. 381]. Scab lesions were found on some of the tubers after four weeks.

Baribeau (B.). **Destruction prématurée des fanes de Pommes de terre.** [Premature destruction of Potato haulms.]—Reprinted from *Agriculture*, [? *Quebec*], 7, 1, 16 pp., 7 figs., 1950.

After discussing various methods for the destruction of potato haulms against blight [*Phytophthora infestans*] and virus diseases [cf. *R.A.M.*, 29, pp. 169; 30, p. 65 and above, p. 187], the author concludes that in view of past experience the most reliable methods are to use the roto-beater, spray with arsenicals, or apply cyanamide dust.

Preventing black rot losses in Sweet Potatoes.—*Leafl. U.S. Dep. Agric.* 280, 6 pp., 1 fig., 1950.

Directions for the control of sweet potato black rot (*Endoconidiophora* [*Ceratostomella*] *fimbriata*) [*R.A.M.*, 29, p. 194] include disinfecting the hotbed framework, using for the hotbed and for setting out soil or sand in which the crop has not been grown before or not for three or four years, and propagating by vine or sprout (bed) cuttings. The bedding stock may be surface-disinfected. When infection is present the crop should not be washed but cured at 85° F. and high humidity for five to ten days, affected potatoes then being removed before dispatch.

Hashioka (Y.). **A comparison of blast resistance in Rice varieties collected from districts in various latitudes.**—*Ann. phytopath. Soc. Japan*, 14, 1–2, pp. 1–5, 1 fig., 1950. [Japanese, with English summary.]

The resistance to blast [*Piricularia oryzae*: *R.A.M.*, 27, p. 443, and next abstracts] of nearly 400 rice varieties indigenous to the various latitudes in Asia was studied in greenhouse inoculation tests and in the field. They fell into the following categories as regards leaf-blast resistance: (*a*) Japanese lowland types, 'Horai' (a Japanese lowland type bred in Formosa) [ibid., 27, p. 444], and North China varieties, all of which developed infection type A; (*b*) Japanese and Formosan upland, central and south Chinese, European, and American varieties, with infection ranging from A to F; and (*c*) Formosan endemic (except upland), Philippine, Celebes, Great and Lesser Sundas, French Indo-Chinese, Siamese, Burmese, and Indian varieties, ranging from B to F. These findings suggest that group (*a*) are closely related varieties while the other groups have mixed genetic constitution. There was no marked difference between the groups in their reaction to ear and node blast. In general the percentage of neck blast was lower in many of the indigenous tropical varieties than in the temperate ones although the reaction to node blast was often the reverse.

Okamoto (H.). **On the influence of phosphate application upon the susceptibility to blast disease in Rice plant.**—*Ann. phytopath. Soc. Japan*, 14, 1–2, pp. 6–8, 1950. [Japanese, with English summary.]

Pot experiments showed that the application of phosphatic fertilizer to phosphorus-deficient soil protected rice plants from blast (*Piricularia oryzae*) [cf. *R.A.M.*, 27, p. 446, and preceding abstract]. The susceptibility of phosphorus-deficient plants to blast was intensified by large supplies of nitrogen. Since unavailable phosphate becomes available with the increase of temperature in the field, phosphatic fertilizers are likely to control blast more effectively when applied at low than at high temperatures.

Yoshii (H.). **Studies on Cephalothecium as a means of the artificial immunization of the agricultural crops. II. On the effect of treatment by the dried mycelium powder of Cephalothecium on the development of leaf blast in Rice seedlings.**—*Ann. phytopath. Soc. Japan*, 14, 1–2, pp. 9–10, 1 fig., 1950. [Japanese, with English summary.]

In further studies on the effect of *Cephalothecium* sp. on the development of leaf blast [*Piricularia ozyzae*] in rice plants [cf. *R.A.M.*, 29, p. 475, and preceding abstracts], the roots of seedlings were immersed for 48 hours in 0·1, 0·05, 0·025, and 0·0125 per cent. suspensions of powdered *Cephalothecium* mycelium. With all concentrations except 0·025 per cent. seedling growth was improved and the foliage turned a deeper green than in the [untreated] check plants. The number of leaf spots was decreased by nearly one half by the 0·1 to 0·05 per cent. suspensions. The reduction in degree of infection appeared to be in proportion to the dosage of powdered mycelium.

Campacci (C. A.). **A 'queimadura do Arroz'.** ['Rice blast'.]—*Biológico*, 16, 6, pp. 128–130, 1950.

In most cases of rice blast in São Paulo, Brazil, the causal organism, *Piricularia oryzae* (the responsibility of which for the disease was demonstrated by inoculation experiments) [cf. *R.A.M.*, 29, p. 582], is found associated with species of *Phoma* and *Helminthosporium* [ibid., 26, p. 335]. *Piricularia oryzae* is carried on the seed, the debris of the rice crop, and other hosts, e.g., *Digitaria sanguinalis*, *Stenotaphrium* sp., and *Distichlis* sp. Practical control of the disease [see preceding abstracts] may be achieved by seed treatment with copper- or mercury-containing fungicides (where infection is superficial); flooding the fields, as practised in Venezuela [ibid., 21, p. 324], when symptoms appear in the seedling stage; liming of the soil and use of potassic and phosphoric fertilizers as required; exclusion of rice from the rotation for several years; and destruction of crop residues and weed hosts.

De Silva (C. A.). **Mycological.**—*Rep. Rubb. Res. Bd Ceylon, 1949*, pp. 13–17, 1950.

It is stated in this report [cf. *R.A.M.*, 29, p. 170] that in 1949 infection of rubber by *Oidium heveae* in the low, wet parts of Ceylon was mild compared with that of 1948, especially in old seedling rubber, where only late-wintering trees were badly affected. Many clones which had defoliated more than once in 1948 refoliated satisfactorily without becoming infected. Clone Prang Besar 86 was among the last to refoliate at Dartonfield, but was not badly affected; the high-yielding Malayan clone PB6/9 sustained repeated attacks, owing to its very late-wintering habit. At the clone museum all 59 clones were infected except LCB. 870, which wintered for the first time since it was planted in 1941, refoliating with the surrounding clones. Its somewhat mature leaves bore only mild traces of secondary infection at the time of the author's visit. It is of robust growth, but not a high yielder.

Shoot die-back due to *Phytophthora* [? *palmivora* and *P.* ? *meadii*: ibid., 28, p. 194] on young bud-grafts occurred where the previous stand had been poisoned with sodium arsenite [ibid., 29, p. 171]; about 2 to 3 per cent. of the old trees had not been killed completely in two years, and there was a prolific seed set, *Phytophthora* pod rot developing and eventually infecting the shoots of the bud-grafts. All old trees should be killed completely within three months of poisoning, an extra dose being given if required.

Root infection by *Fomes lignosus* [loc. cit.] remains of considerable importance in replanting. The fungus was identified in the 'dormant' rhizomorphic stage on the tap roots of old seedling rubber being uprooted at Dartonfield. Every effort should be made to eradicate the disease by burning all infected material *in situ* [cf. ibid., 29, p. 292]. *F. lignosus* was also observed at the bases of old trees killed by poisoning; it is evident that the poisoning method does not destroy *F. lignosus* in the roots of the old trees. The felling of old trees on contract (with the sale of the timber to offset cost) should be given preference over the poisoning method.

The light scraping of trees in tapping on the first signs of dryness on the cuts has given encouraging results against brown bast [ibid., 29, p. 53]; the rest period after scraping is extended to a maximum of six months if inspection at intervals of two months reveals dryness. Only the outer layer of gritty bark is removed and the scraped area disinfected. Of 25 trees of different clones so treated, 20 have come into normal tapping.

H. E. Young (*Oidium* Research Officer) states that the records and the machines indicate that the dusting appliances used give unsatisfactory control of *O. heveae*. Better results would be obtained with a readily portable mist blower, using a wet spray at high concentration to reduce the amount of water required. A 'Portamist'

has been ordered from the United States and, though too weak for work on mature rubber, will be used on trees up to 40 ft. high. Preliminary work also suggested that it may prove advisable to discontinue using sulphur because of its harmful effects on the soil when applied heavily. Early indications of severe iron deficiency chlorosis of rubber due to high soil acidity have already been observed. The search for clones resistant to *O. heveae* has yielded one variety which so far has suffered no leaf fall. Resistance appears to be due to a thick cuticle present on the leaves from the start of new leaf formation.

De Haan (I.). **Gebrekverschijnselen bij Hevea brasiliensis.** [Deficiency symptoms in *Hevea brasiliensis*.]—*Arch. Rubbercult.*, 27, 2, pp. 103–137, 2 figs., 2 graphs, 1950.

This is a fully tabulated survey of pot sand cultures at Bogor, Java, to determine the reactions of *Hevea* rubber plants to the omission of important nutrient elements. The symptoms of these deficiencies have already been briefly described [*R.A.M.*, 23, p. 289].

Angell (H. R.). **Seedling blight. II. Soil in relation to seedling blight of Opium Poppy and Peas.**—*Aust. J. agric. Res.*, 1, 2, pp. 132–140, 1950.

In further studies on seedling blight in Australia [cf. *R.A.M.*, 29, p. 450] infertile soil from the Division of Plant Industry experiment station, soil from a former wheat-growing area at Duntroon, and uncultivated pine plantation soil from Belanglo were used. In the first experiment 40 pots of each soil were partially steam sterilized and divided into eight groups; (*a*) and (*b*) untreated and planted, respectively, with William Massey peas and opium poppy seeds (*Papaver somniferum*); (*c*) and (*d*) the same with *Pythium ultimum* inoculum; (*e*) and (*f*) the same with inoculum and 5 gm. lime added to each pot; and (*g*) and (*h*) the same with lime but no inoculum. Pea emergence and the percentage stand of poppies were estimated 19 days after sowing and after two re-sowings made without the addition of further inoculum or treatment. Both physiogenic and pathogenic seedling blight of poppy occurred. The former did most damage to emerging seedlings in Belanglo soil, but was controlled by liming; it occurred in sterilized soil under conditions that mechanically excluded *P. ultimum*. The beneficial effect of lime in controlling pathogenic seedling blight of poppy in Belanglo soil was evident from the first sowing (0 per cent. stand in both uninoculated and infested compared with 92 and 50 per cent., respectively, with lime), in contrast with its unsignificant effect on peas (89 and 25 per cent., and 89 and 13 per cent.). The destructiveness of seedling blight is thus determined by (*a*) the host, (*b*) the soil, and (*c*) soil treatment. Liming had a depressing effect on the emergence of peas from the Duntroon and Belanglo soils when natural re-infestation occurred.

In a second experiment, designed to eliminate chance re-infestation of Duntroon and Belanglo soils containing poppy seedlings, fair germination was obtained in the former soil, but all the seedlings in the latter died after a few days.

Liebel (L. N.). **Peppermint oil. An economic study.**—*Pop. Bull. Wash. agric. Exp. Sta.* 199, 25 pp., 1 diag., 9 graphs, 1 map, 1950.

In a brief note on peppermint diseases and pests (p. 12), mention is made of the immense losses incurred by growers in the Middle West of the United States through a virus [fungus] infection known as 'anthracnose' or 'leopard spot'. [*Sphaceloma menthae*: *R.A.M.*, 27, p. 120]. Since the disease overwinters on the contaminated organs, Washington farmers have been advised not to import plants from the infected area, in order to prevent the spread of the disease to the Pacific Northwest.

Zattler (F.) & Linke (W.). **Spritzversuche mit Kupfermitteln im Hopfenbau mit und ohne Beimischung von E605 im Jahre 1949.** [Spraying experiments with copper preparations in Hop culture with and without admixture of E605 in the year 1949.]—*Z. PflBau PflSch.*, 1, 2, pp. 49–63, 1950.

As in the previous year's spraying experiments for the joint control of hop downy mildew (*Peronospora*) [*Pseudoperonospora humuli*] and insect pests in Bavaria [*R.A.M.*, 29, p. 55], the admixture of E605 with Kupferkalk Wacker and Ob 21 proved highly advantageous, improving the tenacity of the fungicides and increasing yields by an average of 25 per cent. in the four experimental gardens.

Crandall (B. S.). **Coffee and Cinchona damping-off controlled by post-germination seedbed treatment.**—*Plant Dis. Reptr*, 34, 9, p. 263, 1950. [Multilithed.]

Cinchona plantations have been greatly extended during the post-war years in the Peruvian montaña on the eastern slopes of the Andes. The seedlings, which remain in the seed-bed for many weeks under very humid conditions, are very susceptible to damping-off [see next abstract], caused by *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 21, p. 302; 27, p. 123]. *Cinchona pubescens* was more severely attacked than *C. officinalis*. Infection was arrested by localized area treatments with 48 per cent. wettable spergon (1 gm. in 1 pint water per sq. ft.), followed by a water rinse.

In El Salvador coffee seedlings often suffer heavy losses from late damping-off [cf. ibid., 30, p. 36], known locally as 'mal de talluelo' [small stem disease], which usually develops ten days after germination. Effective control was obtained by weekly applications with 48 per cent. wettable spergon or yellow cuprocide (18 gm. and 45 gm., respectively, to 2 gals. per 24 sq. ft.) started as soon as the disease was observed. The spergon was followed by a water rinse if the cotyledons were open; yellow cuprocide left on the cotyledons gave some control of [unspecified] leaf spot diseases. Perenox has been substituted for yellow cuprocide at 60 gm. to 2 gals. per 24 sq. ft.

Winters (H. F.). **Preventing damping-off in Cinchona seedbeds.**—*Trop. Agriculture, Trin.*, 27, 4–6, pp. 123–126, 2 pl., 1950.

In experiments carried out at Mayaguez, Puerto Rico, spreading 1 in. of screened sphagnum moss over seed-bed soil, whether fumigated with chloropicrin or untreated, effectively controlled damping-off (believed to be caused by a basidiomycete) of *Cinchona ledgeriana* Maricao No. 24 seedlings [see preceding abstract]. Germination was not impaired, and in fumigated soil growth was greatly stimulated. Seedlings grown on plots of sphagnum moss alone did not damp-off, but suffered from nutrient deficiency. Soil fumigation with chloropicrin one month before sowing prevented damping-off, but reduced germination.

Brandes (E. W.), Taggart (W. G.), & Munson (J. J.). **Release of new Sugar Cane variety CP. 43–47.**—*Sug. Bull., N.O.*, 28, 19, p. 291, 1950.

The release of the C.P. 43–47 sugar-cane variety for commercial planting in the autumn of 1950 has been jointly approved by the Division of Sugar Plant Investigations of the Bureau of Plant Industry, United States Department of Agriculture, the Louisiana State Agricultural Experiment Station, and the American Sugar Cane League of the U.S.A. The new variety is moderately resistant to red rot [*Physalospora tucumanensis*], fairly susceptible to root rot [*Pythium* spp., including *P. arrhenomanes*: ibid., 29, p. 583], and has shown a low percentage of [sugar-cane] mosaic [virus: ibid., 28, p. 309] at Raceland.

Mattos (R. A.). **Antecedentes sobre el 'carbón' de la Caña de Azúcar en el Chaco.** [Antecedents of Sugar-Cane smut in the Chaco.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 155–166, 2 figs., 1 map, 1949. [English summary.]

Sugar-cane smut (*Ustilago scitaminea*] first appeared in the Chaco, north-eastern

Argentina [*R.A.M.*, 29, p. 501], in 1941 and assumed economic importance between that year and 1948, necessitating the replacement of the widely cultivated, highly susceptible P.O.J. 36 variety by the resistant Co. 290. Other varieties showing resistance in Las Palmas are Co. 270, Tuc 2680, Tuc 1406, Tuc 2645, Tuc 2683, Tuc 1149, Tuc 2701, P.O.J. 2961, and P.O.J. 2878 [ibid., 26, p. 512], and during the season of 1947–8 their substitution for the susceptible lines resulted in effective control of the disease [ibid., 27, p. 99].

Stevenson (J. A.) & Cárdenas (M.). **Lista preliminar de los hongos de Bolivia.** [Preliminary list of the fungi of Bolivia.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 77–134, 1949. [English summary.]

Included in this preliminary annotated list of some 400 fungi collected in Bolivia from 1832 up to the present time [cf. *R.A.M.*, 24, pp. 271, 286 and next abstract] are *Albugo candida* [*Cystopus candidus*] on radish [ibid., 27, p. 542], *Peronospora aestivalis* [ibid., 25, p. 579] and *Pseudopeziza medicaginis* [C.M.I. map No. 129] on lucerne, *Catacauma huberi* on *Hevea* rubber leaves [ibid., 26, p. 334], *Phyllachora gratissima* on avocado [ibid., 21, p. 163], *P. maydis* on maize [ibid., 26, p. 197], *P. balansae* on *Cedrela* sp. [ibid., 27, p. 542 and next abstract], *Tranzschelia* [*Puccinia*] *pruni-spinosae* on peach, *Phakopsora crotalariae* on *Crotalaria anagyroides* [ibid., 25, p. 141], *Uromyces caryophyllinus* [*U. dianthi*] on carnation [ibid., 29, p. 260], *U. fabae* on broad bean [ibid., 29, p. 5], *U. flectens* on clover [ibid., 25, p. 454], *Diplodia tubericola* on sweet potato [ibid., 26, p. 130], *Septoria lycopersici* on tomato, *S. tritici* on wheat, and *Cercospora coffeicola* on coffee [ibid., 29, p. 478].

Marchionatto (J. B.). **Hongos exóticos.** [Exotic fungi.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 135–153, 2 pl., 1 fig., 1949. [English summary.]

Among the records in this critically annotated list of 45 fungi (mostly parasitic) collected in Uruguay, Paraguay, Brazil, Chile, and Bolivia [cf. preceding abstract], besides those already noticed from other sources, may be mentioned *Alternaria peglionii* on wheat [*R.A.M.*, 17, p. 449] in Uruguay; *Claviceps purpurea* on a new host, *Setaria geniculata*, in Rio Grande, Brazil; *Curvularia inaequalis* [ibid., 27, p. 30] on rice in Rio Grande do Sul, Brazil; *Cylindrosporium mori* on mulberry [ibid., 26, p. 219] in Uruguay; *Phyllachora balansae* on *Cedrela* sp. [see preceding abstract], *Physalospora obtusa* on chestnut, and *Rhizoctonia bataticola* [*Macrophomina phaseoli*] on soy-bean [ibid., 28, p. 154], and *Tranzschelia punctata* [*Puccinia pruni-spinosae*], heavily parasitized by *Darluca filum* [loc. cit.] on plum, all in Rio Grande do Sul.

[Dennis (R. W. G.)]. **Preliminary report on collections of the larger fungi made by the Assistant Mycologist in Trinidad, B.W.I., during the autumn, 1949.**—*Kew Bull., 1950*, 2, pp. 165–169, 1950.

A list is given of the genera of Agaricaceae (44) represented in Trinidad together with the localities surveyed. From among the preliminary conclusions drawn it appears that the absence of *Cortinarius* and *Boletus* may be related to the absence of ectotrophic mycorrhiza in the local forest trees. Nearly 66 per cent. of the species were found on wood or on debris in the early stages of decomposition, and the remainder on the ground or on thoroughly disintegrated humus. *Omphalia flavida* [*R.A.M.*, 29, p. 478] was found to be parasitic on native plants in virgin rain-forest in Trinidad and Jamaica; reservoirs of infection for coffee may be expected to occur in the native rain forests throughout the West Indies. *Marasmius perniciosus* [ibid., 29, p. 204] was observed only on cacao [ibid., 30, p. 145]. *Clitocybe tabescens* [cf. ibid., 27, p. 279; 28, p. 365] and *Armillaria mellea* [C.M.I. map No. 143] do not appear to be present in Trinidad.

Dennis (R. W. G.). **Karsten's species of Mollisia.**—*Kew Bull., 1950*, 2, pp. 171–187, 8 figs., 1950.

Descriptions are given, based on a critical re-examination of the type material, of those species of *Mollisia* described by Karsten in his Mycologia Fennica.

Ramakrishnan (T. S.) & Ramakrishnan (K.). **Additions to fungi of Madras—VII, VIII.**—*Proc. Indian Acad. Sci.*, Sect. B, 32, 3, pp. 67–79; 4, pp. 97–111, 30 figs., 1950.

These further contributions to the authors' critically annotated list [*R.A.M.*, 28, p. 488] comprise a number of new species, among which the following may be mentioned. *Sphaerodothis borassi* forms on both surfaces of *Borassus flabellifer* leaves elliptical, isolated or confluent, brown spots, each containing varying numbers of unilocular stromata. The hyaline, clavate, straight or flexuous asci measure 66 to 126 by 15 to 30 (average 93 by 20) μ and contain eight unicellular, irregularly disposed, reddish-brown, fusoid ascospores with minutely reticulate walls, 21 to 39 by 6 to 15 (30 by 11) μ.

Septogloeum feroniae produces on the foliage of *Feronia elephantum* [*F. limonia*] minute, isolated or confluent, brown, slightly sunken spots, with black, subepidermal, erumpent acervuli in the centre. The straight or flexuous, cylindrical to obclavate, uni- to quadriseptate, subhyaline to pale olivaceous conidia measure 24 to 45 by 3 to 6 (33 by 4) μ and are borne on short conidiophores.

Both surfaces of *Agapanthus umbellatus* leaves bear elongated, grey, red-bordered spots caused by *Mycosphaerella agapanthi*, with ostiolate, black, globose perithecia surrounded by a membranous, dull brown wall; hyaline, subglobose to oblong asci, 25 to 50 by 14 to 29 (36 by 21) μ; and oblong, bicellular ascospores, 14 to 25 by 4 to 7 (19 by 5) μ.

Discella cedrelae forms on both surfaces of *Cedrela toona* leaves numerous circular or irregular spots with shining black, flattened or discoid, subepidermal pycnidia arranged round a central straw-coloured zone, 2 to 4 mm. in diameter; and pedicellate, oblong, bicellular, subhyaline, smooth pycnidiospores, 13 to 20 by 7 to 12 (18 by 9) μ.

Infection of *Cassia fistula* leaves by *Phleospora cassiae* results in the development on both surfaces of circular or irregular, brown to tawny-olive spots, the lower side zonate and buff-brown in places, 5 to 35 mm. in diameter; the subepidermal, wide-mouthed, semi-immersed pycnidia are arranged in concentric rings; and the narrow, elongated, slightly curved, triseptate pycnidiospores, borne on densely aggregated pedicels, measure 22 to 41 by 2 to 5 (32 by 4) μ.

Mayor (E.) & Viennot-Bourgin (G.). **Contribution à l'étude des micromycètes de Corse.** [A contribution to the study of the microfungi of Corsica.]—*Rev. Mycologie*, 15, 2, pp. 80–118, 2 figs., 1950.

This annotated list of fungi collected in Corsica in May, 1949, includes, in addition to five new species, *Ustilago avenae* in panicles of *Avena barbata*, *Puccinia coronata* on sheaths and leaf-blades of the same host, *Dimerosporium elliotii* on leaf bases and young branches of *Erica arborea*, *Melampsora lini* on stems and leaves of *Linum gallicum*, leaves of *L. strictum*, and on *L. angustifolium*, *Entyloma scalianum* on *Chrysanthemum coronarium*, *Uromyces fabae* on broad bean and *Vicia narbonensis*, *U. limonii* [*R.A.M.*, 19, pp. 168, 730] on *Limonium vulgare*, *Coniothyrium hellebori* [ibid., 29, p. 467] on adult leaves of *Helleborus corsicus*, and *P. glumarum* on *Hordeum murinum*.

Hendrickx (F. L.). **Liste annotée de champignons congolais.—I.** [Annotated list of Congolese fungi.—I.] –*Publ. Inst. nat. Étude agron. Congo belge*, 1, 2, pp. 125–144, 1944. [Received September, 1950.]

This annotated list of fungi not previously reported in the Belgian Congo

[*R.A.M.*, 28, p. 311] or in certain parts of the colony includes *Mycosphaerella erythrinae* causing brown leaf spot of *Erythrina abyssinica* at Mulungu; *M. manihotis* [ibid., 29, p. 400], common on leaves of cassava at Katana, Bambesa, Paulis, and Mulungu; *Physalospora rhodina* [ibid., 12, p. 366] on cotton bolls at Bambesa; and *Sphaerostilbe repens*, causing root rot of *Pachyra aquatica* at Yangambi. *Hemileia vastatrix* [ibid., 28, p. 31] occurs at Kivu and in the Ituri wherever coffee is cultivated. The damage caused is of little importance, however, and fungicidal treatment is rarely needed. *Kuehneola* [*Cerotelium*] *fici* [ibid., 3, p. 88] is common on leaves of cultivated figs [ibid., 28, p. 210]; *Puccinia chrysanthemi* [C.M.I. map No. 117] was reported on leaves of cultivated chrysanthemum at Mulungu in 1938 and Butembo in 1940; *P. glumarum* [ibid., 27, p. 312] is prevalent throughout the eastern part of the colony where wheat is grown; *P. helianthi* occurred on sunflower [ibid., 29, p. 333; C.M.I. map No. 195] at Mulungu in 1939; *Melampsorella ricini* [ibid., 29, p. 408] occurs frequently on indigenous *Ricinus* at Mulungu; *Sphacelotheca sorghi* [ibid., 28, p. 564] was reported on inflorescences of sorghum at Musienene in 1941; and *Urocystis gladioli* [*U. gladiolicola*: ibid., 29, p. 307] on cultivated gladiolus at Kavumu and Luamisole in 1940–41. *Armillariella* [*Armillaria*] *mellea* is one of the most dangerous pathogens attacking *Cinchona ledgeriana* [ibid., 25, p. 154]; it also attacks coffee, rose geranium [*Pelargonium graveolens*], and apple trees. As with other root rots control is aimed at immunizing healthy trees adjacent to the centre of infection. *Septoria apii* [ibid., 4, p. 261] is prevalent on celery leaves and was probably introduced with the seed. *Pestalotia theae* [ibid., 7, p. 275] on tea is controlled by spraying with Bordeaux mixture. Brown leaf spots on groundnuts at Bambesa were due to *Cercospora arachidicola* [ibid., 27, p. 158; and C.M.I. map No. 166] and not to *C. personata* [ibid., 29, p. 408; and C.M.I. map No. 152] as is generally the case in the Belgian Congo. *C. coffeicola* [ibid., 29, p. 478] is easily controlled by spraying with Bordeaux mixture. *Fusarium conglutinans* [ibid., 23, p. 371], which caused tracheomycosis of cabbages at Bambesa in 1940, was probably introduced with the seed; *F. moniliforme* [*Gibberella fujikuroi*: C.M.I. map No. 102] occurred on sorghum inflorescences at Musienene in 1941, and [*G.f.*] var. *conglutinans* on bananas [ibid., 17, p. 50; C.M.I. map No. 191] at Sinda in 1942.

Scaramuzzi (G.). **Chiarimenti intorno al 'seccume concentrico' delle foglie di Tabacco.** [Elucidatory notes on 'concentric wilt' of Tobacco leaves.]—*Tabacco*, 54, 613, pp. 252–259, 1950.

This is a reprint of an article already reviewed [*R.A.M.*, 29, p. 482] from another source.

Plant pathological department.—*Rep. Tocklai Exp. Sta. Indian Tea Ass., 1949*, pp. 23–33, 1950.

In this report [cf. *R.A.M.*, 30, p. 126] it is recorded that in further attempts to isolate the bacillus found in Looper and Bunch caterpillars when killed off by epidemics, suspensions of isolates were sprayed on to the latter. Further isolations were made from insects which developed the disease. Increases in larval mortality were obtained with two bacilli, BCA and LCA. From larvae which died after spraying with BCA a similar bacillus was obtained, which produced similar mortality when sprayed on to Bunch caterpillars. Pathogenicity declined with successive subcultures.

In experiments on the control of *Sclerotinia* disease of tea flowers, seed baries sprayed with 1 per cent. Bordeaux mixture plus 0·1 per cent. zinc sulphate gave more than double the seed yield of the unsprayed. Field observations were continued on a standard set of 900 tea bushes in which the time of appearance and

disappearance of certain virus-like symptoms is noted annually. A stem disease of tea due to *Aglaospora* sp. [ibid., 27, p. 260] was widespread in the Darjeeling District, and several severe attacks by *Hypoxylon asarcodes* [loc. cit.] were noted in the Terai. Sclerotia of *Corticium invisum* [ibid., 28, p. 249] were found in the field on tea bushes and on *Crotalaria anagyroides*. In collaboration with the botanical laboratory the department is attempting to standardize a technique for the laboratory inoculation of tea shoots with *Exobasidium vexans* [ibid., 30, p. 80], the object being to study the host-parasite relationship in different types of tea as a preliminary to work on resistance. The laboratory temperature is suitable for work on blister blight for only six weeks in the year, and there is an interaction between type of tea, light intensity, and blister formation.

R. I. Macalpine (pp. 37, 38) states that the spring of 1949 was marked by persistent rain and comparatively low temperatures. *E. vexans* was severe early in the season. Middle and upper elevation estates suffered considerably, especially in pruned areas. In one estate at the upper middle elevation a pruned area of *Assamica* tea was very severely affected and had not formed a table by the beginning of August; many estates had similar experiences. The disease remained severe throughout the season; incidence was very heavy in September–October and persisted late into the cooler weather. On certain Terai estates there was a considerable incidence of root rots, particularly *Fomes lamaoensis* [*F. noxius*: ibid., 20, pp. 127, 137; 22, p. 405], *H. asarcodes*, and *Ustulina zonata* [ibid., 27, p. 260]. *H. asarcodes* can cause great mortality in estates near the hills; in one a considerable area of tea was everywhere attacked and appeared to be doomed. Measures to eradicate affected bushes must be taken early if heavy damage is to be avoided.

Aglaospora appears to be serious only when the fungus attacks bushes already weakened; in such cases infection can be fatal. On one severely affected estate the main damage resulted after pruning, many bushes failing to flush in the following growing season. Debilitation from natural causes, such as drought, as well as from artificial ones, such as excessive plucking, appears to predispose bushes to fatal attack.

De Jong (P.). **Report on the preliminary experiments on the control of blister blight on Tea in bearing.**—*Plant. Chron.*, 45, 18, pp. 478–483, 1950.

In order to protect tea in bearing from attack by *E*[*xobasidium*] *vexans* in South India [*R.A.M.*, 30, p. 81, and preceding abstract] during what the author considers to be danger periods, viz., April to May and August to September, it seems necessary to treat the bushes immediately after each round of plucking. Susceptible material still remaining on the bush would thus be protected. Dusting [cf. ibid., 27, p. 388] was considered as an alternative to knapsack spraying [ibid., 30, pp. 80, 82] for two reasons. (1) Infection is now known to take place through the upper leaf surface [ibid., 29, p. 337] as well as the lower; (2) local sources of supply of high grade talc exist and new grinding mills have recently been established in India making the production of finely divided, evenly matched fungicidal dusts relatively easy and cheap. Three copper fungicides containing 5, 7½, and 10 per cent. copper were used at 15, 25, and 35 lb. per acre on a 2-acre site on Mayfield Estate. Dusting (with Waldron Hand Distributors) started in March, 1950, the first samples of treated flush being harvested and manufactured on 6th to 8th April. Two further samples were collected at weekly intervals. After one round of dusting the copper content of the made teas was mostly insignificant (trace to 50 p.p.m.), except with the 10 per cent. dust (20 to 125). All treatments and the untreated (due to drift) showed an increase (61 to 147 p.p.m.) after the second dusting with a further slight general increase after the third, although in some cases there was a decline. The fungicidal value of the treatments could not be estimated until July and August when a slight attack only of disease developed after a very dry period. The intensity of attack in

the Nilgiri–Wynaad was not typical in 1950, but some treatments consistently gave a statistically significant degree of control, particularly the 7½ per cent. dust at 35 lb. per acre. Further investigations are in progress.

Report on the operations of the Tobacco Board and Tobacco Warehouse, Mauritius, year ended 30th June, 1950.—23 pp., 1950.

In this report by N. Craig it is recorded that 43 cases of tobacco leaf curl [virus: *R.A.M.*, 29, p. 351] were observed in Mauritius during the year.

Costa (A. S.) & Forster (R.). **Um enrolamento das fôlhas do Fumo de causa genética.** [A Tobacco leaf roll of genetic origin.]—*Bragantia, S. Paulo*, 9, 1–4, pp. 43–45, 1 fig., 1949. [English summary. Received January, 1951.]

The leaf roll observed for many years in commercial tobacco plantings in São Paulo, Brazil, and formerly attributed to the leaf curl virus [*R.A.M.*, 29, p. 127 and preceding abstract] has been shown by further studies to be transmitted by more than one pair of recessive genes. Repeated attempts to convey the leaf roll from affected to healthy plants by grafting, juice inoculation, and insect vectors gave consistently negative results.

Limasset (P.), Cornuet (P.), & Gendron (Y.). **Comparaison entre l'extraction du virus de la mosaïque du Tabac par voie mécanique et sous l'action de divers systèmes enzymatiques.** [A comparison between the extraction of Tobacco mosaic virus by mechanical means and under the action of various enzymatic systems.]—*Ann. Épiphyt.*, Sér. C, 1, 1, pp. 1–12, 1950.

Further studies on tobacco mosaic virus in Samsun tobacco leaves carried out at the Central Station of Plant Pathology [Versailles: cf. *R.A.M.*, 29, p. 59] gave no evidence of a virus held *in vivo* that could be freed only by the action of enzymes from the snail [loc. cit.]. At the very most one might suppose that following the first grinding with a motor screw-grinder the cytoplasmic proteins remaining in the pulp might retain a certain virus fraction. However, several successive triturations and stirrings followed by washing exhaust the pulp and fibres of the virus so that the use of enzymes is rendered unnecessary.

Manil (P.). **Essais de culture de virus dans les tumeurs de 'crown gall' sur des espèces végétales ne donnant pas d'infection généralisée.** [Experiments on virus culture in crown gall tumours on plant species not developing systemic infection.]—*C. R. Soc. Biol., Paris*, 144, pp. 453–454, 1950.

The results of experiments carried out at Gembloux in 1949 indicated that the tobacco mosaic virus does not multiply in the tumorous stem tissues of *Datura stramonium* inoculated with *Phytomonas* [*Bacterium*] *tumefaciens* [*R.A.M.*, 29, p. 576]. The virus did multiply, however, in tobacco stem tumours [ibid., 28, p. 35], although the number of lesions (about 10 per leaf) it produced on *Nicotiana glutinosa* was smaller than expected. Similar results were obtained in analogous experiments using the tobacco necrosis virus.

Hirayama (S.). **Respiration of the tissue of mosaic diseased Tobacco plants.**—*Ann. phytopath. Soc. Japan*, 14, 1–2, pp. 29–32, 1950. [Japanese, with English summary.]

The respiratory rate (as measured by Warburg's manometer) of the tissues of tobacco leaves infected with tobacco mosaic virus was greater than that of healthy leaves although similar respiratory quotients (0·94) were obtained [cf. *R.A.M.*, 27, p. 162; 30, p. 63]. Anaerobic respiration was also stronger in diseased than in healthy leaves. The increased respiration in diseased leaves was markedly accelerated in older leaves. The same amount of oxygen was taken up by the root

tissues of both diseased and healthy plants but carbon dioxide production of diseased plants was very low under both aerobic and anaerobic conditions. This is considered to be due to incomplete oxidation in diseased plants during aerobic respiration.

HILL (A. V.). **Yellow dwarf of Tobacco in Australia. IV. Some host plants of the virus.**—*Aust. J. agric. Res.*, 1, 2, pp. 141–143, 1 pl., 1950.

In experiments carried out at the Division of Plant Industry, Canberra, the tobacco yellow leaf dwarf virus [cf. *R.A.M.*, 21, p. 430; 30, p. 18, and next abstract] was transmitted readily by grafting from tobacco to tobacco, tomato, *Nicotiana glutinosa*, *Solanum nigrum*, *Datura stramonium*, *S. laciniatum*, and *N. glauca*, its occurrence in these plants being confirmed by back grafts to tobacco. Similarly it was transmitted from tomato to tomato and *D. stramonium*, from the latter to the same host, and from *S. nigrum* to tomato. Field plants of *N. rustica*, *N. chinensis*, *N. purpurea*, and *N. trigonophylla* were affected by the virus. Natural infection of *D. stramonium*, *D. tatula*, and tomato growing in widely separated districts remote from tobacco growing areas was confirmed several times by grafting to tobacco. The symptoms usually appeared 28 to 35 days after grafting, while with insect transmission to tobacco they usually appeared in 14 to 21 days. The disease was transmitted by *Orosius argentatus* [loc. cit.] to tobacco, tomato, and *Datura stramonium*.

In the Shepparton district of Victoria during November to December jassids were present on many species of plants and large numbers of nymphs and adults occurred on *Cryptostemma calendulaceum* and on *Erodium cicularium* and *Medicago denticulata* in association with it. Both nymphs and adults from these weeds readily transmitted the disease to tobacco and *D. stramonium*. It was also transmitted by adults from clover (*Trifolium repens*), *Bursaria spinosa*, lucerne, and ornamental plants.

Infective *O. argentatus* collected in the field during early summer were kept in a breeding cage on *Malva parviflora*, beet, *C. calendulaceum*, *Medicago denticulata*, and *D. stramonium* and in the following spring transferred to cages containing *E. cicutarium*, *C. calendulaceum*, beet, and *M. denticulata*. After eggs were laid the jassids were removed and the subsequent nymphs and adults bred on each plant were transferred to separate lots of tobacco. Some or all of each lot developed yellow leaf dwarf, indicating that each of these species must be considered a probable host for the virus.

HELSON (G. A. H.). **Yellow dwarf of Tobacco in Australia. V. Transmission by Orosius argentatus (Evans) to some alternative host plants.**—*Aust. J. agric. Res.*, 1, 2, pp. 144–147, 1 pl., 1950.

In further experiments on the transmission of the tobacco yellow dwarf virus [see preceding abstract and below, p. 215] at Canberra, Australia, the virus was obtained from *Datura stramonium* plants, to which it had been transmitted by grafting from a single tobacco plant showing typical symptoms. *Orosius argentatus* was infected from these plants and the insects transferred to test hosts for about a week when they were replaced by virus-free insects later fed on healthy *D. stramonium*. These plants were then grafted to healthy tobacco which later developed typical yellow dwarf symptoms. The tests showed that the virus can be transmitted experimentally to at least 15 hosts, eight of which are summer annuals [loc. cit.], including *Callistephus chinensis*, *Brassica adpressa*, *Sonchus oleraceus*, and *Silybum marianum*, and seven autumn-spring growing plants [loc. cit.], including *Erodium cygnorum*, most of which are common throughout the areas where the disease is most serious. *Modiola caroliniana* and *Hypochaeris radicata* could act as continuous carriers of the virus throughout the year. Thus the virtually continuous succession and wide range

of host plants, and their occurrence in the districts where tobacco is grown, make methods of control by the elimination of alternative host plants appear impracticable.

Stover (R. H.). **The black rootrot disease of Tobacco. I. Studies on the causal organism Thielaviopsis basicola.**—*Canad. J. Res.*, Sect. C, 28, 4, pp. 445–470, 3 pl., 2 figs., 2 diags., 1950.

Intensive cultural studies at Toronto University with *Thielaviopsis basicola* [*R.A.M.*, 29, p. 458; 30, p. 127], the agent of black root rot of tobacco, showed that it exists in nature in two distinct forms which are called the brown and grey wild types and are differentiated by their cultural characteristics on potato dextrose agar. The colonies of the brown type are cinnamon to light brownish olive or greyish olive in colour, attaining an average diameter of 23 mm. after 8 days at room temperature. The range of endoconidial length is 7·38 to 21·58 μ. Surface mycelial growth occurs at the perimeter of the colony. This type strongly inhibited bacterial antagonist 'A'. The grey types are pallid neutral grey to various shades of grey and black with an average diameter of 17 mm. after 8 days. The range of endoconidial length is 8·52 to 29·01 μ. At the colony perimeter the mycelium often becomes submerged and filamentous. In the presence of bacterial antagonist 'A' growth becomes submerged but is not greatly inhibited. The brown type usually predominates in isolations although in some instances the grey predominates in mixed infestations. The balance between each type may be partly determined by a differential selective action of the soil flora. The grey type is less pathogenic and less well adapted to withstand long dormant periods than the brown. The latter occasionally mutates to the grey in soil, in the host, and in artificial culture. Occasionally the grey type mutates to the brown, but only in association with host passage. The wild types do not remain stable on media which support abundant saprophytic growth, but give rise to and are crowded out or replaced by cultural mutants. They can be maintained with a minimum of variation in soil, soil agar, roots, or similar substrates low in certain nutrients. The endoconidia sometimes produce yeast-like colonies consisting almost entirely of masses of endoconidia; sometimes they develop into thick-walled chlamydospore-like structures, termed 'secondary chlamydospores'. Morphology in the host was characteristic for each of the three phases, cell penetration, cell colonization, and the production of chlamydospores and endoconidia.

Thielavia basicola [ibid., 28, p. 90; 29, p. 124] was observed in and on roots only if they were infected with *Thielaviopsis basicola* and was most prevalent in May and June when the latter was most active. Perithecial formation, resulting from inoculating *Thielavia* into several tobacco varieties and legumes, was very sparse unless *Thielaviopsis* was also present in the roots. The evidence suggests that a commensalistic relationship may exist between these two fungi.

Sixty-second Annual Report of the Kentucky Agricultural Experiment Station for the year 1949.—92 pp., 1950.

In this report on the results of research in 1949 [cf. *R.A.M.*, 29, p. 460] it is stated (pp. 5–8) that after eliminating tobacco plants susceptible to wildfire [*Pseudomonas tabacum*: ibid., 29, p. 586] from the F_2 of the fourth back-cross, those remaining were field inoculated and further selected. Several of the progeny were homozygous for resistance to wildfire. Homozygous, dark, fire-cured hybrids have also been developed by back-crossing dark, fired tobacco with wildfire-resistant Burley.

Three new Burley varieties have been named Ky 26, Ky 35, and Ky 57. Ky 26 (formerly BB 13–46) is somewhat more resistant to black root rot [*Thielaviopsis basicola*: ibid., 29, p. 461 and preceding abstract] than Ky 16. Ky 35 (F17A–46)

[ibid., 28, p. 327] is resistant to *Fusarium* wilt [*F. oxysporum* var. *nicotianae*] and [tobacco] mosaic [virus], and moderately resistant to black root rot; it has nearly replaced Ky 33 and Ky 34 in *Fusarium* wilt areas. It is, however, very susceptible to the veinbanding virus [strain of tobacco mosaic virus: ibid., 20, p. 606] from potatoes, affected plants developing chlorosis followed by small necrotic leaf spots that gradually coalesce to destroy large areas. Ky 57 is highly resistant to black root rot and resistant to mosaic.

A wild tobacco species received as *Nicotiana tomentosiformis* proved, as claimed by Dr. F. O. Holmes, to be resistant to the etch virus [ibid., 26, p. 32] and to be a symptomless carrier of the veinbanding virus. It also has the same type of resistance to mosaic as that found in the Ambalema variety [ibid., 25, p. 476].

Of 49 species of *Nicotiana* tested for reaction to tobacco streak virus [ibid., 27, p. 65] some proved more susceptible than Burley. *N. glauca* and *N. benavidesii*, and possibly *N. arentsii*, *N. cordifolia*, *N. maritima*, and *N. raimondii* offer promise as stock for breeding resistant Burley tobacco. Inoculum of the streak virus prepared as previously described [ibid., 29, p. 438] was still virulent after storage for 3 days at 4° C.; it can be diluted with four parts M/100 sodium sulphite without reducing the number of local lesions developing on rubbed tobacco leaves. From the average number of local lesions produced on 16 sq. cm. of tobacco leaf it appeared that 1:2 dilution of the inoculum with water would be a better test for determining the inhibiting effect of healthy juice than undiluted, inasmuch as the titre of the undiluted inoculum might be reduced considerably without a reduction in detectable local lesions.

Of 44 *Nicotiana* spp. tested for resistance to mosaic, 17 and also some plants of four other species developed mottling or mosaic as the dominant symptom; yellowing and stunting often accompanied by mottling or necrosis were the chief symptoms of eight species. Some plants of two species developed mild mottle while others were symptomless. In one species distortion occurred without mottling while another showed no symptoms at all. Local necrotic spots often followed by systemic necrosis occurred in five species and in some plants of the four species mentioned above. Local necrotic spots without subsequent systemic infection developed in six species.

Since the incidence of *Fusarium* wilt appears to be increasing, various methods of inoculating large numbers of young tobacco plants were attempted as a means of testing for resistance. Young susceptible plants of Ky 56 injected with a spore suspension developed symptoms in 3 or 4 days. Symptoms appear to be produced by the fungus rather than by a toxin, as toxinless cultures produced symptoms and killed cultures did not.

In July, 1949, an unidentified virus was isolated from a tobacco plant at the Experiment Station farm. Although the symptoms resembled those of a yellow strain of ring spot, typical ring spot patterns did not develop in the greenhouse. The virus is distinct from the known mild and severe strains and it produced local lesions and systemic infection in *Amaranthus 'globosus'*. Another unidentified virus, apparently distinct from all the common strains of known viruses on tobacco, was isolated from a plant artificially infected with streak in the greenhouse. Also a strain of streak that appears to produce more chlorosis and less necrosis on tobacco than the common strain has been isolated.

CRANE (M. B.). **Masters Memorial Lectures, 1950. The origin and improvement of cultivated plants. Part II.**—*J.R. hort. Soc.*, 75, 12, pp. 465–474, 4 pl., 1 fig., 2 graphs, 1950.

In breeding experiments at the John Innes Horticultural Institution with tomatoes for resistance to *Cladosporium fulvum* [*R.A.M.*, 26, p. 371; 28, p. 510; 30, p. 3] some of the older varieties proved dominant for resistance, while others are

recessive. At first the resistants had small fruit, a rather low yield, and late maturity. The first two defects have been overcome, and attempts are in progress to obtain early ripening combined with resistance.

Peach varieties without leaf glands are highly susceptible to mildew [*Sphaerotheca pannosa* var. *persicae*: cf. ibid., 24, p. 193], while those with globose or reniform glands are extremely resistant. A family raised by selfing the glandless variety Royal George became badly affected; no spraying was done and all the plants died. Twenty-eight individuals of a selfed Lord Napier family (with reniform glands) remained entirely free from mildew, and two trees developed very slight late symptoms, though many branches of the two families were interlaced.

JØRSTAD (I.). **Melding om sykdommer på skogtrærne i 1942-1947.** [Report on forest tree diseases in the years 1942 to 1947.]—Reprinted from *Skogdirekt. Årsmeld., Oslo, 1943–1947*, 9 pp. 1949.

Some of the information collected since the publication of the last report on forest tree diseases in Norway [*R.A.M.*, 25, p. 17] has already been noticed, but the following items may be noted. *Chrysomyxa pyrolae* was exceptionally prevalent on spruce [ibid., 15, p. 618; 30, p. 124]. Of its three alternate hosts, *Pyrola minor*, *P. rotundifolia*, and *P. secunda*, only *P. minor* bore teleutospores. Other species of *Chrysomyxa* on spruce were *C. woronini* and *C. ledi* (first record for Norway), with *Ledum palustre* as the alternate host of both [loc. cit. and ibid., 27, p. 301]; *C. rhododendendri*, forming its uredo stage on *Rhododendron hirsutum*, *R. ferrugineum*, and their hybrids [ibid., 20, p. 136]; and *C. abietis*, which was particularly severe on *Picea pungens* and *P. engelmanni* [ibid., 25, p. 17]. *Crumenula abietina* was reported by Robak in 1946 to have caused top die-back of young spruces [ibid., 27, p. 396].

Polyporus [*Fomes*] *pinicola* [ibid., 28, p. 336] is a very common saprophyte on spruce but is seldom parasitic. In 1947, however, it was the cause of a cubical basal rot. *Armillaria mellea* was responsible for the death of a number of spruces [ibid., 25, p. 482; 26, p. 368] in a 60-year-old planting in 1942.

Pine rusts included *Cronartium ribicola* on *Pinus strobus* and *P. flexilis*, black currants also being severely damaged [see above, p. 166], *C. flaccidum*, *Melampsora pinitorqua*, and *Coleosporium campanulae* [ibid., 25, p. 18]; among the alternate hosts of the last-named, besides those previously listed, were *Odontites rubra* and *Inula salicina*. *Phacidium infestans* was reported on pine [ibid., 28, p. 495] from various localities.

Rhabdocline pseudotsugae has extended its range on Douglas fir [*Pseudotsuga taxifolia*: ibid., 25, p. 18] in an easterly direction and also farther north in the west of the country.

Melampsoridium betulae [*M. betulinum*], which is very common on birch [ibid., 25, p. 18], was recorded for the first time in the aecidial stage on larch. Other pathogens observed on birch included *Polyporus* [*F.*] *conchatus* (first record on birch for Norway).

Venturia tremulae [ibid., 19, p. 387] was very prevalent on aspen in 1942, causing wilt and blackening of the shoots. Poplar rust (*Melampsora larici-populina*) [ibid., 25, p. 145] is particularly widespread in Rogaland. Severe defoliation of poplars, especially *P. nigra* var. *italica*, may be caused by *Drepanopeziza* [*Pseudopeziza*] *populorum*, better known in its conidial state of *Marssonina populi* [ibid., 18, p. 154]. *P. candicans* was severely attacked in 1942 by *V. populina* [ibid., 26, p. 571].

Nectria galligena [ibid., 23, p. 47] and *Pseudomonas* [*savastanoi* var.] *fraxini* [ibid., 18, p. 825; C.M.I. map No. 134] were both observed causing ash canker during the period under review. Elms were infected by *Phleospora ulmi* and *Platychora ulmi*, causing a white leaf spot and foliar scab, respectively. The maple [*Acer* spp.]

pathogens observed included *Uncinula bicornis* and *U. aceris* [ibid., 24, p. 257], also *N. cinnabarina* [ibid., 28, p. 39], which was also extremely prevalent on lime trees (*Tilia* spp.), usually concomitant with frost.

Thirtieth Annual Report of the Forestry Commissioners for the year ending September 30th, 1949.—148 pp., 8 pl., 9 maps, 1950.

In the diseases and pests section (pp. 59–61) of this report [cf. *R.A.M.*, 29, p. 541] it is stated that although the great majority of plantations in Great Britain are free from disease, die-back of European larch [ibid., 29, pp. 544, 591] associated with *Dasyscypha* [*willkommii*], frost damage, and insects is one of the most serious diseases, being widespread but not universal. No further larch seed of susceptible species is being purchased from Switzerland and northern Italy. Japanese larch [*Larix leptolepis*] is increasingly taking the place of European larch as it is immune from die-back [ibid., 29, p. 187]. Weymouth pine (*Pinus strobus*) cannot be grown successfully in Great Britain because of its susceptibility to the white pine blister rust (*Peridermium strobi*) [*Cronartium ribicola*: ibid., 29, p. 184]. The Black Italian poplar [*Populus canadensis* var. *serotina*] and *P. robusta* are virtually immune from [undetermined] bacterial canker [ibid., 29, pp. 282, 541] and thrive very well on suitable sites. *Fomes annosus* [loc. cit.] has made little progress in British forests and few new centres of infection have been discovered. Plantations of Douglas fir [*Pseudotsuga taxifolia*] attacked by *Phaeocryptopus gaeumannii* [loc. cit.] improve in most cases as they age.

Mezzetti (A.). **Osservazioni sulla morfologia e sulla tassonomia del Gyroceras celtidis (Biv.) Mont. et Ces.** [Observations on the morphology and taxonomy of *Gyroceras celtidis* (Biv.) Mont. & Ces.]—*Ann. Sper. agr.*, N.S., 4, 5, pp. 857–867, 2 pl., 6 figs., 1950. [English summary.]

In August, 1949, almost all the leaves of a few hundred young beam trees (*Celtis australis*) in a nursery near Rome were severely spotted by *Gyroceras* [*Helicoceras*] *celtidis* [*R.A.M.*, 5, p. 268]. The lesions, up to 2 cm. in diameter, were hypophyllous and surrounded by a whitish halo, the centres being olivaceous brown to fuliginous and velvety. The areas often became confluent and the white halo disappeared beneath a brown, olivaceous to blackish, powdery layer which covered the whole area. An ill-defined chlorosis was generally apparent on the upper surface of adult leaves. The hyaline or greenish hyphae permeating the lower surface measured 2 to 4 μ in diameter and bore at right angles numerous clavate, continuous branches, brownish at the tips, 10 to 30 μ long, to which often two or three chains of reproductive cells, which the author interprets as phaeophragmo-conidia, were attached. The brown, hook-shaped chains had an average length of 60 to 90 μ, measured from the point of insertion to the topmost point of the crook, and a maximum width of 6 to 8 μ.

After a month and a half at 20 to 25° C. colonies from monospore isolates reached their maximum diameter of about 30 mm. The surface was velvety and a fairly dark olivaceous brown. It was frequently partially hidden by whitish or pink aerial mycelium. In old cultures on potato dextrose agar, blackish isodiametrical bodies about 200 μ in diameter appeared, possibly outlines of the perfect fructifications. Czapek's agar proved the best medium both for growth and fructification, and into this *H. celtidis* diffused a purplish pigment, which became very dark in old cultures. After 20 hours' incubation at about 25° in hanging drops the cells of the chains had swollen and many had produced a germ-tube. Branched chains occurred only sporadically in culture. An emended diagnosis is given, and the author indicates certain morphological and ecological affinities between this fungus and certain Phaeophragmiae, especially *Clasterosporium*.

Moore (M. H.). **Nut rotting in Corylus avellana L. in relation to the activities of the Nut weevil, Balaninus nucum L.**—*J. hort. Sci.*, 25, 4, pp. 213–224, 2 pl., 1950.

This is a full account of an investigation into the rotting of *Corylus avellana* nuts associated with *Sclerotinia fructigena* in Kent, a preliminary report on which has already been noticed [*R.A.M.*, 27, p. 266]. In inoculation experiments in 1946, 20 out of 23 needle-punctured inoculated nuts developed rotting even after spraying with copper oxychloride (0·05 per cent. copper), 23 out of 25 rotting when not sprayed. Of 26 nuts punctured without inoculation all rotted after spraying, compared with 20 out of 22 unsprayed. On the other hand, of the non-punctured nuts the only ones developing rotting were those attacked by weevils (*Balaninus nucum*). Most of the rotted nuts bore spore cushions of *S. fructigena*. Other inoculation experiments showed that of the fungi isolated from unhealthy nuts *Botrytis cinerea* and *Fusarium lateritium* [*Gibberella lateritia*] are active but minor wound parasites, while *Cladosporium herbarum* causes only very localized rotting.

It is concluded that the rot is mainly due to wound parasitism by *S. fructigena* following oviposition punctures by the nut weevil in soft shelled nuts early in July.

Dickey (R. D.), Drosdoff (M.), & Hamilton (J.). **Copper deficiency of Tung in Florida.**—*Bull. Fla agric. Exp. Sta.* 447, 32 pp., 10 figs., 1948. [Received September, 1950.]

Some of this information concerning copper deficiency of tung trees (*Aleurites fordii*) in Florida has already been noticed from other sources [*R.A.M.*, 23, p. 463; 27, p. 396]. In experiments carried out from 1943 to 1947 soil applications of $\frac{1}{2}$ to 1 lb. dry copper sulphate or 1 oz. in 1 pt. water corrected the deficiency in eight-year-old trees and $\frac{1}{6}$ oz. in $\frac{3}{4}$ pt. water in severely affected one-year-old trees, while 3 oz. of the dry salt reduced the incidence of symptoms considerably. Foliage applications of copper-lime mixture ameliorated the condition in one- to four-year-old tung trees, but only an 8–8–100 concentration as a single application was effective over the whole season.

In an experiment carried out from 1943 to 1945 in which high and low levels of copper sulphate were applied to each tree, the Isabel variety proved more susceptible to copper deficiency than F–9 seedlings. Six budded varieties and seven seedling progenies of *A. fordii* were treated for three years with approximately 4½oz. dry copper sulphate. The lowest average scores of copper deficiency symptoms reckoned on a scale from 0 (no symptoms) to 100 (very severe symptoms on the foliage) were obtained by the budded variety G. 37 (11) and seedling progeny F–9 (12). There was no significant difference between the scores of the budded varieties and seedling progenies where both appeared in the planting; e.g., G. 37S(eedling) scored 18·8 and G. 37B(udded) 11; F–546B 20·7, F–546S 20, and F–566B 49·7 and F–566S 25·6.

Midshoot leaves from deficient trees contained 3 p.p.m. copper or less in late summer, while normal trees contained 4 p.p.m. or more. The copper content of both deficient and normal leaves tended to increase late in the season.

Soil applications of superphosphate had no adverse affect on copper uptake by the trees.

McDonough (E. S.), Bell (Lois), & Arnold (Georgia). **A water-labile fungistatic extractive characterizing living trees.**—*Nature, Lond.*, 166, 4233, p. 1034, 1950.

In experiments carried out at Marquette University, Milwaukee, Wisconsin, ground samples of the stems of *Catalpa speciosa* were extracted with 95 per cent. ethyl alcohol. Filter paper was impregnated with the extracts and placed on potato dextrose agar plates inoculated with *Schizophyllum commune*. Inhibition of the fungus was in proportion to the concentration of extractive used, heartwood extract

giving the most inhibition, followed by sapwood, and then bark [cf. *R.A.M.*, 29, pp. 422, 447]. Fungistatic materials were also obtained by hot-water extraction, although alcohol extracts of high inhibiting power were demonstrated in the wood even after it had been boiled in water for three hours. Wood taken from living elms, which are subject to rapid decay by *S. commune* after felling, contained comparatively small amounts of inhibiting substance. Alcohol extracts were stable, but there was a negative correlation between their fungistatic capacity and the length of time branches were stored in the laboratory or in water at room temperature.

Hornibrook (E. M.). **Estimating defect in mature and overmature stands of three Rocky Mountain conifers.**—*J. For.*, 48, 9, pp. 408–417, 6 figs., 1950.

From 1944 to 1946, 1,299 trees of lodgepole pine [*Pinus contorta* var. *latifolia*], Engelmann spruce [*Picea engelmanni*], and alpine fir [*Abies lasiocarpa*], which ranged in age from 105 to 260 years, in the Fraser Experimental Forest, Colorado, were surveyed for defects before and after felling [cf. *R.A.M.*, 29, p. 485]. Defect indicators, in order of importance, were fungus fructifications, swollen knots, sound produced when the tree is pounded, decay showing in increment cores, crook and sweep, fire scars, forks, cankers, frayed branch stubs, and weather and top injuries. Wood decay was responsible for 87 per cent. of the defects, of which 64 per cent. was caused by *Fomes pini* [loc. cit.], especially in lodgepole pine. The characteristics of decayed timber associated with certain fungi in the three tree species are tabulated [cf. ibid., 27, p. 547]. Root and butt rots caused 14 per cent. of the total defect, *Polyporus circinatus* [ibid., 29, p. 392], *Coniophora cerebella* [*C. puteana*], *Armillaria mellea* [loc. cit.], and *P. osseus* causing 8, 5, 1 per cent., and a trace, respectively. White trunk rot caused by *F. nigrolimitatus* was found once. The outstanding external indicator of *F. pini* rot is the swollen knot on lodgepole pine and the sunken knot on Engelmann spruce and alpine fir. Brown trunk rots caused 9 per cent. of the total amount of cull, *Peniophora luna*, not previously recorded in Colorado, being responsible for 5·4 per cent. It was associated with frayed branch stubs and caused a pocket rot in lodgepole pine and Engelmann spruce. *F. pinicola* and *Trametes serialis* attacking these two tree species caused 2 and 0·5 per cent. cull, respectively. *Stereum sanguinolentum* on Engelmann spruce and alpine fir caused 2 per cent. *F. laricis* [ibid., 20, p. 552] occurred once on a lodgepole pine.

Detailed procedure is given for estimating defect. Trees with sporophores or swollen knots of *F. pini* and with sporophores of *F. pinicola* or *F. laricis* should be considered complete culls. In increment cores, the fungi diagnosed to be present will determine the amount of the butt which should be culled. From field evidence it was found that these defect rules allowed accurate estimates of cull volume to be made; nine out of ten trees in the first trial being culls. In the second, the estimated percentage of defect was 13·2 and the actual, 15·4.

Little (S.). **Ecology and silviculture of White Cedar and associated hardwoods in southern New Jersey.**—*Bull. Sch. For. Yale* 56, 103 pp., 9 pl., 1950.

Of the relatively few fungi attacking [southern] white cedar (*Chamaecyparis thyoides*) in southern New Jersey (pp. 90–91), *Keithia* [*Didymascella*] *chamaecyparissi* [*R.A.M.*, 11, p. 140] may kill young trees; *Trametes subrosea* destroys the heartwood and particularly the sapwood of cut timber when stored or used in the forest, but the rot is seldom present in living trees less than 80 years old, although recently an affected stand 40 to 50 years old [cf. loc. cit.] was found in Ocean county after basal wounding by a surface fire. In general although native fungal diseases may slightly reduce the growth and yield of southern white cedar stands in New Jersey, they have no important effect on managed stands.

McQuilkin (W. E.). **Effects of some growth regulators and dressings on the healing of tree wounds.**—*J. For.*, 48, 9, pp. 423–428, 1950.

A summary is presented of the results of eleven studies dealing with treatments to promote the healing of tree wounds [cf. *R.A.M.*, 29, p. 32; 30, p. 112], which were carried out from 1942 onwards at the Beltsville Experimental Forest, Maryland, a natural, second-growth woodland of trees ranging from 7 to 20 in. in diameter. Every available species was used and the standard wound was an elliptical cut, 3 by 1·5 in. The number of wounds did not affect the normal growth of the tree except in a few cases, but 32 wounds were accepted as a safe number. Good healing occurred in wounds painted with shellac [cf. ibid., 22, p. 29] and overcoated with plastic asphaltum. Lanolin [ibid., 16, p. 689] promoted healing by preventing drying and die-back, thereby allowing callus to form promptly at the wound edges. Lanolin and rosin (10–4) and lanolin-rosin-pine gum (10–2–2) were superior in physical properties to lanolin alone. No growth promoting substance proved beneficial. White oak [*Quercus alba*] was the fastest healer, many wounds closing in a year, and Virginia pine [*Pinus virginiana*] the slowest, although there was little die-back and no fungal infection in this species because of pitch exudation. Red maple [*Acer rubrum*] wounds were often long in closing because of excessive [unspecified] die-back. No treatment tested was effective in preventing discoloration of the wood around increment-bore wounds [ibid., 29, p. 237].

Forest Products Division. Ottawa laboratory—Vancouver laboratory. Program of work, June 1950–May 1951.—[11]+56 pp., 1950. [Mimeographed.]

Brief details are given of the projects to be carried out by the various units of the Ottawa and Vancouver laboratories of the Forest Products Division during the period June, 1950 to May, 1951. The projects envisaged by C. Greaves for the wood preservation and pathology section at Ottawa (pp. 11–18) include researches on the service life of treated and untreated timbers in Canada, the preservative treatment of ties and fence posts [*R.A.M.*, 28, pp. 99, 100], laboratory and accelerated service tests of wood preservatives, and analysis of preservatives. Pathological problems include a study of 1,300 cultures of air-borne fungi from seasoning yards, the control of decay in birch logs and lumber, and the cause and development of brown stain (*Cytospora* sp.) in red pine [*Pinus resinosa*] sapwood.

W. M. Conners (pp. 40–45) states that projects under way at Vancouver include attempts to reduce surface tension to improve the impregnation by creosote of mountain-type Douglas fir [*Pseudotsuga taxifolia*: ibid., 29, p. 4], a comparison of the durability of butt-treated lodgepole pine [*Pinus contorta* var. *latifolia*] and cedar [*Thuja plicata*] poles [ibid., 28, p. 101], the impregnation of wood by preservatives in the vapour phase, a study of wood stains, sapstain and mould prevention [ibid., 29, p. 548], and the use of irradiation for the detection of incipient decay.

Richards (D. B.). **Decay resistance and physical properties of wood.**—*J. For.*, 48, 9, pp. 420–422, 1950.

Longitudinal, radial, and periclinal pieces of sapwood from two single logs of loblolly pine (*Pinus taeda*) and red gum (*Liquidambar styraciflua*) were subjected to decay in wide-mouthed jars 6 by 6 by 8½ in. containing malt agar, by pure cultures of *Poria monticola*, *Polyporus* [*Polystictus*] *abietinus* [*R.A.M.*, 18, p. 561] for the former, and *Lenzites trabea* and *Polyporus* [*Polystictus*] *versicolor* for the latter at the New York State College of Forestry. Samples were removed from the decay chambers at two-week intervals up to 14 weeks and the weight-loss due to decay was calculated as a percentage of the original oven-dry weight. For the conditions of the experiment no significant relationship was found between decay resistance and either specific gravity or the different positions within the sapwood of either species.

Middleton (J. T.), Kendrick (J. B.), & Schwalm (H. W.). **Injury to herbaceous plants by smog or air pollution.**—*Plant Dis. Reptr*, 34, 9, pp. 245–252, 3 figs., 1 map, 1950. [Multilithed.]

Observations in the Los Angeles area revealed that the extensive and annually increasing foliage injury to vegetable crops and other herbaceous plants in the south coastal basin of southern California is caused by 'smog' (a term coined from smoke and fog) or air pollution. The authors list the air pollutants, the susceptible plants, and symptoms, and review the losses. Severe damage occurred in 1947, 1948, and 1949, especially on spinach, lettuce, and lucerne, the aggregate loss in 1949 being computed at $479,495 when entire spinach fields were unharvestable through scorch. The toxic elements are in the nature of aerosols and they are being identified.

Moore (W. D.), Conover (R. A.), & Stoddard (D. L.). **The sclerotiniose disease of vegetable crops in Florida.**—*Bull. Fla agric. Exp. Sta.* 457, 20 pp., 7 figs., 1949. [Received September, 1950.]

During the last fifteen years vegetables in different parts of Florida have shown increasingly severe infection by *Sclerotinia sclerotiorum* [*R.A.M.*, 29, pp. 88, 341, 452, *et passim*]. Field snap beans [*Phaseolus vulgaris*] may become infected [ibid., 28, p. 45] at any time after emergence. Tomato plants are attacked on or near the main stems when about 2 to 2½ feet high [ibid., 17, p. 566; 28, p. 554]; if moisture under the foliage remains high, infection spreads rapidly to the stems, leaves, and fruits often killing the plants.

Potatoes may be attacked [ibid., 20, p. 419; 26, p. 123] at low temperatures when the branches overlap from one row to another and moisture accumulates under the foliage. Most of the inoculum appears to be air-borne spores. The most serious damage follows infection of the main stem from infected leaves and branches and from organic matter on the soil surface. It turns yellow and dies prematurely.

Cultural conditions of celery are usually more conducive to infection than for any other in Florida [ibid., 20, pp. 192, 563]. During the growing season the plants are subjected to numerous small injuries which afford points of entry. Infections may develop on any part of the plant, though usually most conspicuous on the stalks near the ground. The disease often occurs in winter. Celery from affected beds should not be used for transplanting.

Losses of lettuce [ibid., 25, pp. 23, 535] range up to 100 per cent. in some fields. Cabbage is also attacked [ibid., 29, p. 341]. Other vegetable crops grown in Florida suffer only minor damage. [Chilli] pepper [ibid., 11, p. 803] and eggplant [ibid., 24, p. 253] along the lower east coast are affected in some seasons, injury being largely confined to the stems and branches. On squash and cucumbers [ibid., 15, p. 477] the disease is usually confined to scattered plants. Losses on turnips and carrots are not, as a rule, serious. Numerous wild hosts are affected.

All susceptible weeds and shrubs adjacent to cultivated fields must be destroyed and all infected material destroyed before it dries. Wider spacing and crop rotation are advisable. Pre-cooling before transit is recommended and all commodities with even a trace of infection should be transported as rapidly as possible.

Takahashi (W. N.). **The morphology and host range of Brassica nigra virus.**—*Amer. J. Bot.*, 36, 7, pp. 533–535, 1 fig., 1949. [Received January, 1951.]

Extracts of leaf tissue of mustard (*Brassica nigra*) affected by mosaic were inoculated into various *Brassica* spp., tobacco, and *Nicotiana glutinosa*. *B. juncea* and *B. alba* developed typical, severe, systemic mosaic symptoms; *B. campestris* var. *chinensis* and var. *pekinensis* a mild mosaic; *B. rapus* (Dwarf Essex rape) occasional yellow flecks and breaks in the whitish leaf bloom; *B. nigra* and *B. arvensis* small, brown, local lesions on the inoculated leaves and a general mosaic

on subsequent leaves; and a curious pattern of small rings appeared on inoculated leaves of *B. carinata*, a red venation developing later on newly formed leaves. No symptoms occurred on tobacco or *N. glutinosa*. So far as the author is aware this mosaic disease of *B. nigra* has not been described before.

Electron micrographs of juice from inoculated *B. nigra* and *B. juncea* showed two distinct types of particles, one spherical, the other elongated and flexuous and measuring about 12×700 mμ; healthy juice contained only spherical particles. It is presumed that the elongated particles were the virus of *B. nigra*, as the undiluted preparation was highly infectious (10 out of 10 positive).

Symptom manifestation appeared to be controlled to some extent by the genomic constitution of the species. *B. nigra* (8 chromosomes) and *B. campestris* (10 chromosomes) were severely affected; *B. juncea* (containing one *nigra* set and one *campestris* set) was highly susceptible. Varieties of *B. oleracea* (9 chromosomes) could not be infected, while *B. carinata* (one *nigra* and one *oleracea* set) and *B. rapus* (one *oleracea* and one *campestris*) displayed mild symptoms.

Atkinson (R. G.). **Studies on the parasitism and variation of Alternaria raphani.**—*Canad. J. Res.*, Sect. C, 28, 3, pp. 288–317, 3 pl., 1 diag., 4 graphs, 1950.

In the course of a study in Ontario on the natural infection of radish seed with *Alternaria raphani* [*R.A.M.*, 28, pp. 159, 440], it was found that Canadian isolates also caused a severe leaf blight of Brompton and Ten Weeks stocks (*M*[*atthiola*] *incana* var. *annua* and var. *autumnalis*) [ibid., 29, p. 415] and wallflowers. Stock leaves inoculated with spore suspensions developed pale grey to greyish green, sunken, dot lesions which coalesced to areas 10 by 2 to 5 mm. The apical portions of the lower leaves drooped and became yellow and shrivelled. The lower and middle leaves were most susceptible. On green leaves yellowish green haloes surrounded the spots. Wallflowers when inoculated developed numerous greyish brown lesions, and the yellow green haloes produced a mottling effect. Under field conditions at St. Catherines the disease progressed most rapidly between 22° and 26° C. The fungus does not seem to overwinter on plant debris in the soil. An increase in soil moisture increased seedling disease. At soil moisture contents of 26 to 39 per cent. infection was lowest at 18° and at 32 per cent. soil moisture was low at 23° also.

Five of the thirteen wild type strains, into which the 312 isolates were grouped, differed widely in virulence and sporulation but had similar growth rates and nutritional requirements for maximum growth. Abundant sporulation was obtained by scraping and cutting plate cultures and then removing the lid. Culturally related variant strains appeared naturally in agar and soil cultures; they differed in pathogenicity, growth rate, and nutrition, but all showed almost complete loss of sporulation. It is thought that the variants because of their spontaneous origin and stability are mutants. In greenhouse tests arasan, 1 per cent. ceresan, and spergon dusts appreciably reduced a seedling infection rate of 31·1 per cent. in Scarlet Globe radish by 32·2, 40·2, and 26·5 per cent., respectively; 50 per cent. infection in Sparkler was reduced by 8·5, 25·2, and 15·8 per cent., respectively. All treatments increased emergence in the greenhouse by approximately 15 per cent. In field tests, however, only arasan increased emergence, although all treatments reduced seedling infection. Cultures of the fungus were found to survive in dry soil for at least 18 months with no change in cultural habit, virulence, or sporulation.

Heinze (K.). **Die Viruskrankheiten der Rübe und ihre Übertragung durch Insekten.** [Virus diseases of Beet and their transmission by insects.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 3, 1–2, pp. 1–7, 4 figs., 4 graphs, 1949. [Received June, 1950.]

The beet yellows virus is spreading gradually from western Germany [*R.A.M.*, 28,

p. 609; 29, p. 549] to the east. In September, 1948, 10 per cent. of beet plants on a test plot at Dahlem, Berlin, were affected. *Doralis* [*Aphis*] *fabae*, in spite of the great numbers, appears to be of less importance in transmission [cf. loc. cit.] than *Myzodes* [*Myzus*] *persicae*. Should the disease spread further, it is best that 'steckling' crops be transferred to areas with low *M. persicae* populations, and no beet or mangold stands grown within a radius of 1 to 3 km. Seed beet fields should be also kept at a good distance from all beet plantings. All beet, mangold, and winter spinach fields should be ploughed in after harvest to eliminate overwintering sources. Very early sowing and sufficient manuring are also recommended. For the control of beet yellows and also mosaic [ibid., 14, pp. 417, 808], which is less important in Germany, it is suggested that the presence of stecklings and seed beet, which are the main sources of infection, could be avoided by changing beet into an annual by vernalisation of the seed.

Sylvester (E. S.). **Effect of starving infective aphids on the transmission of the Beet yellow-net virus.**—*Phytopathology*, 40, 8, p. 782, 1950.

To determine the effect of fasting after infection feeding on the relationship between beet yellow-net virus and *Myzus persicae* [*R.A.M.*, 28, p. 433], apterae reared on a diseased plant were starved in a vial for periods of 4, 8, 12, and 24 hours before testing singly for infectivity on healthy beet seedlings at the University of California, Berkeley. In the first test ten out of 30 plants contracted infection from aphids given four hours' fasting, and nine with eight hours, compared with six out of 30 with non-starved insects. In the second, 18 out of 30 plants were infected by non-starved apterae, 21 out of 30 after 12 hours' starvation, and 14 out of 30 after 24 hours. It would appear from these results that starving for periods of less than 24 hours exerted little or no effect on the capacity of the aphids for the retention or transmission of the yellow-net virus.

Coleman (L. C.). **Tumor induction in Vicia faba and other hosts by Agrobacterium rubi (Hildebrand) Starr and Weiss.**—*Canad. J. Res.*, Sect. C, 28, 3, pp. 277–282, 2 pl., 1950.

Large tumours were produced when a bacterium isolated from Himalaya blackberry (*Rubus*) [*procerus*] was inoculated into stems of young broad bean plants at the Dominion Laboratory of Plant Pathology, Saanichton. The organism was compared with a standard culture of *Agrobacterium* [*Bacterium*] *tumefaciens*, which had failed to induce tumours in broad bean. The blackberry bacterium failed to attack tomato, *Nicotiana glutinosa*, and *Datura meteloides*, all susceptible to *Bact. tumefaciens*, while on sunflower [*R.A.M.*, 28, p. 275; 29, p. 502] it produced smaller galls and caused no epinasty of the leaves. Tumours were also induced on garden pea by inoculation.

The blackberry organism was evidently distinct from *Bact. tumefaciens* and because of the restricted host range is considered to be *A.* [*Bact.*] *rubi* [ibid., 25, p. 292]. It grew more slowly on potato dextrose agar and gave a typical acid reaction in litmus milk and failed to grow on a nitrate nutrient agar [ibid., 20, p. 373]. *Bact. tumefaciens* gave a greyish-brown colour with litmus milk and grew well with nitrate. The host range of *Bact. rubi* is probably much wider than reported and, as it embraces plants only slightly or not at all susceptible to *Bact. tumefaciens*, is likely to prove important in providing material for the study of plant tumours.

Cox (R. S.). **Stem anthracnose of Lima Beans.**—*Tech. Bull. N.C. agric. Exp. Sta.* 90, 28 pp., 7 figs., 1 graph, 1950.

Some of the information in this paper has been noted from another source [*R.A.M.*, 27, p. 306]. Greenhouse inoculation tests with *Colletotrichum truncatum* at Raleigh, North Carolina, in 1947–8 showed that crimson clover (*Trifolium*

incarnatum), subterranean clover (*T. subterraneum*), a variety of *Phaseolus vulgaris* B–17572A, groundnut, and sweet clover (*Melilotus alba*) did not contract any infection. Minimum, optimum, and maximum temperatures for growth in culture were 5°, 25° to 30° (near 27°), and 35° C., respectively, and for sporulation 17°, 27°, and 31°, respectively. Spores germinate and hyphae penetrate the cuticle of Lima bean (*P. lunatus*) leaves within 22 hours. Subepidermal cells are penetrated within 46 hours, and symptoms are visible after 48 to 72. A vascular discoloration as far as 150 mm. from where the spore suspension was injected in stems and petioles, was evident within 5 days. Mycelium was eventually found in the vessels.

In field spraying tests in 1947 the highest yield was obtained with 15 weekly applications of phygon (1·5–100) with 189 bush. per acre compared with 65 bush. for the unsprayed. In 1948, 11 weekly applications of dithane Z-78 (1·5 to 100) or phygon XL (0·5 to 100) gave the best results, the yields being 355 and 317 bush. per acre, and the percentage of spotted pods 32 and 57, respectively, compared with 191 bush. and 58 per cent. for the untreated. In 1948 dust tests at the same rate, 8 per cent. dithane Z-78 gave the highest yields (294 bush. per acre) followed by 8 per cent. zerlate (259), 5 per cent. phygon XL (237), and untreated (229). Control is recommended by the use of disease-free seed, ploughing under in the autumn Lima bean refuse on which the fungus may overwinter, and weekly applications of dithane Z-78 or phygon sprays.

Weimer (J. L.). **Blackpatch of Soybean and other forage legumes.**—*Phytopathology*, 40, 8, pp. 782–784, 1 fig., 1950.

Black patch disease, originally reported on clover in Wisconsin and caused by a sterile fungus of uncertain identity [*R.A.M.*, 16, p. 616], was observed on soybeans at the Georgia Experiment Station in 1948. The lesions resemble those of frogeye (*Cercospora sojina*) [ibid., 27, p. 7; 28, p. 54], but are usually more angular, of less uniform size, and bear the characteristic dark brown to black hyphal strands of the black patch fungus on the surface. They are circular, ellipsoidal, or irregularly shaped, mostly 1 to 5 mm. in diameter, and may coalesce to involve half or more of a leaflet. On young plants the lesions are cream-buff (Ridgway) at the periphery, grading towards buff-olive at the centre, and sometimes surrounded on the upper surface by a narrow, sepia border. On the cotyledons the colour of the spots ranges from Saccardo's umber to sepia. On the other hosts affected, namely, cowpea, *Pueraria thunbergiana P. hirsuta*, and blue lupin (*Lupinus angustifolius*), the lesions are similar to those on soy-bean in shape and size, but the colour of the upper surface ranges from nearly white, ivory-yellow or light buff to Dresden or mummy brown, according to the plant and its age and environment. On *P. hirsuta* the sharply delimited spots are without the yellow border common on the other hosts.

The fungus has not fruited either in nature or in culture. Inoculation experiments with blended mycelium resulted in moderate to heavy infection on Ogden, Palmetto, and Arcadian soy-beans, slight to moderate on Groit cowpea, heavy on crimson clover, and moderate on blue lupin. Only the new leaflets of *P. hirsuta* contracted the disease.

Capoor (S. P.) & Varma (P. M.). **A new virus disease of Dolichos lablab.**—*Curr. Sci.*, 19, 8, pp. 248–249, 1 fig., 1950.

A virus disease of *Dolichos lablab* characterized by broad, bright yellow patches on the leaves, was first observed in July, 1950, at Poona, and has since been encountered in several other localities, the most seriously affected being Gujrat, Khandesh, and Deccan. The white fly *Bemisia tabaci* was the only one of the insects tested which proved capable of transmitting the virus from diseased to healthy plants (48 out of 54), the incubation period ranging from 14 to 20 days. Juice

inoculation and seed transmission tests did not result in the development of infection. The symptoms of a virus disease of *Phaseolus lunatus*, also transmissible by *B. tabaci* [*R.A.M.*, 27, p. 550], are similar to those seen on *D. lablab*. However, in several tests infective white flies failed to transmit the *D. lablab* virus to 34 *P. lunatus* plants, while the yellow mosaic virus of *P. lunatus* was innocuous to *D. lablab*. Enation mosaic of the latter host [ibid., 27, p. 309], which is sap-transmissible but has not yet been conveyed by any insect vectors, is quite distinct from the present virus, for which the name of 'yellow mosaic of *D. lablab*' is proposed.

Out of 12 plants of a variety manifesting immunity from the disease in the field, only one contracted infection after being fed upon by 20 to 30 viruliferous white flies in glasshouse tests, as compared with all 12 of a susceptible variety.

Owen (J. H.), Walker (J. C.), & Stahmann (M. A.). **Variability in Onion neck-rot fungi.**—*Phytopathology*, 40, 8, pp. 749–768, 5 figs., 1950.

In a study at the University of Wisconsin, Madison, on natural and induced variability in *Botrytis allii* [C.M.I. map No. 169] and *B. byssoidea* [C.M.I. map No. 165], agents of onion neck rot [*R.A.M.*, 6, p. 267; 28, p. 160, *et passim*], typical wild strains of both species induced similar symptoms on the host, except for the more profuse sporulation of the former, but on culture media *B. allii* sporulated abundantly, whereas *B. byssoidea* produced a rank-growing, white, flocculent mycelium with few or no spores. Both species appeared to be very stable in culture. The conidia of *B. byssoidea* were slightly larger (10 to 14 μ by 7 to 8) than those of *B. allii* (8 to 10 by 5 to 6 μ). Mycelial cultures of typical *B. allii* were obtained by making hyphal transfers from non-sporulating tufts and by treatment with nitrogen mustard (methyl-bis (β-chloroethyl) amine) [cf. ibid., 28, p. 610]. However, these mycelial variants reverted to sporulation after several mass transfers, and no permanent cultures of the *B. byssoidea* type were secured in this way.

A highly variable, atypical wild strain of *B. allii* was isolated from onion only once. It readily gave rise to mutants, and in the second monospore generation a number of variant groups were formed differing mutually in the presence or absence of sporulation, sclerotia, or appressoria. Cultures with characters resembling those of the several variants were produced in the third monospore generation. However, none of the variants of *B. allii*, whether induced by nitrogen mustard or arising spontaneously, could be referred to *B. byssoidea*. Neither nitrogen mustard treatment nor ultra-violet irradiation [cf. ibid., 28, p. 636] of the conidia and mycelium induced sporulation in *B. byssoidea*, but they caused the development of variants of differing growth rates and pathogenicity. The latter species was grown on a wide range of culture media, but sporulation occurred only on a synthetic substratum containing sodium citrate or potassium oxalate as a carbon source. Sclerotia were formed at low temperatures (8° to 16° C.) on potato dextrose agar and at 24° when 0·25 to 0·75 per cent. uranium nitrate [cf. ibid., 28, p. 374] was added.

Rich (S.). **Soil treatments for the field control of Lettuce big-vein.**—*Plant Dis. Reptr*, 34, 9, pp. 253–255, 1950. [Multilithed.]

Lettuce big vein virus [*R.A.M.*, 29, p. 134] has become increasingly important in Connecticut, causing severe losses of crops grown for the early market. Experiments were carried out at the Agricultural Experiment Station, New Haven, with various soil disinfectants, on plots into which contaminated soil had been incorporated the previous autumn. The plots were treated on 21st April and Cos lettuce seedlings were set out on 10th May. The two most promising treatments were chloropicrin (diluted to one-quarter commercial strength with xylene, at 500 lb. per acre) with 2·5 per cent. infection, and 1·6 per cent. formaldehyde (1 qt. per sq. ft.) with 5·6 per cent. infection, but the plants were more vigorous than

untreated ones which also had 5·6 per cent. infection. Dichlorobutene (400 lb. per acre) and 30 per cent. ethyl alcohol (1 qt. per sq. ft.) allowed only 1·1 and 2·4 per cent. infection, respectively, but were too toxic to lettuce to be used as spring treatment. However, they may be valuable for autumn treatments.

It is suggested that formaldehyde could best be used as a dust, impregnated on an organic carrier such as ground oat hulls or sawdust. Such material would at the same time reduce weeds and control damping-off fungi.

Malaguti (G.) & Pontis (R. E.). **Phytophthora capsici in Venezuela.**—*Riv. Agric. subtrop. trop.*, 44, 1–3, pp. 4–12, 3 figs., 1950. [Italian, with English summary.]

Most of this information on the occurrence of *Phytophthora capsici* on chilli pepper in Venezuela has already been noticed from another source [*R.A.M.*, 30, p. 10]. The fungus also causes buckeye rot of tomato and fruit rot of squash. Aerial parts of the plants are attacked only in the rainy season when the diseases may assume epiphytotic proportions.

Prevot (P.) & Commun (R. L.). **Désinfection des semences d'Arachide (A.E.F.–A.O.F.).** Disinfection of Groundnut seed (French Equatorial Africa–French West Africa).]—*Oléagineux*, 6, 1, pp. 1–10, 1 pl., 2 graphs, 2 diags., 1951.

During 1950 parallel tests of various fungicides on the germination and emergence of groundnut seed [*R.A.M.*, 29, p. 491] and the duration of efficacy were carried out at Loudima, Middle French Congo, and three localities in Senegal. The best results were given by dusts nos. 6 and 7 (both non-commercial, composition not known), 9 (tetramethylthiuram disulphide), 3 (methoxyethyl mercury silicate), 4 (organo-mercury compound), and 1 (same as 3 plus γ isomer of H.C.H. [gammexane]). In one experiment products 7, 6, 3, 5 (orthoxyquinoline sulphate), and 4 increased emergence by 41, 39, 39, 32, and 31 per cent., respectively, over the untreated. Product 7 at 150, 225, and 300 gm. per q. gave yields of 725, 615, and 664 kg. per ha. as against 143 kg. per ha. for the untreated, the corresponding figures for product 3 at 100, 150, and 200 gm. being 663, 550, and 731 kg. Product 7 showed longest duration of fungicidal efficacy; 160 treated seeds put to germinate on the day of treatment, and one week, two weeks, and 31 days later contained, respectively, 21, 13, 19, and 16 mouldy seeds, as against 75, 160, 144, and 150, respectively, for the untreated.

The cost of treatment is under 50 francs (C.F.A.) per ha.; at a moderate estimate the increase in yield for this area is 20 per cent. of 750 kg., so that at a value of 14 francs per kg. for the crop there is a gross gain of 2,100 francs per ha. Treatment can now be carried out on a large scale with the aid of the local agricultural services. Seed disinfection just before sowing is the first and one of the most effective means of developing groundnut production.

Vatna (S.). **The rooted Coprinus.**—Collected Papers presented at the Science Conference, 1949, sponsored by The Science Society of Thailand, pp. 25–30, 1 fig., [? 1950. Thai, with English summary].

The mushroom grown for food in Bangkok is a *Volvaria* sp. [cf. *R.A.M.*, 27, pp. 61, 405; 29, p. 399] and when it is grown in horse dung or rice straw a crop of a rooted *Coprinus* sp. develops abundantly five to seven days before the *Volvaria*. It is very delicious. The cap is 3 to 4 cm. in diameter, at first white and cylindrical, later bell-shaped or expanded and pale brown on the top, smooth, and with a notched or lobed margin. The young stem is 5 to 6 cm. long, white, smooth, hollow, and lengthens out into a root-like structure. As the plant matures the stem becomes more than twice as long; at this stage the cap deliquesces. The fungus is usually very short-lived, and grows naturally on dung, richly manured ground, or rotted

grass. It does not appear to have been named specifically, and the author suggests *C. radicatus* [without a Latin diagnosis].

Mushroom growing.—*Bull. Minist. Agric., Lond.*, 34, 68 pp., 39 figs., 1950. 3*s.* 6*d.*

This fifth edition of bulletin No. 34 on mushroom growing [*R.A.M.*, 18, p. 151], revised by H. H. Glasscock, contains much new information, comprising results of recent researches in Great Britain and other countries, notably the United States. The bibliography of previous editions has been substituted by a list of text references and recent publications, and an index has been added.

Chevaugeon (J.). **Maladies cryptogamiques du Manioc en Côte d'Ivoire. I. Observations préliminaires sur la nécrose des sommités.** [Cryptogamic diseases of Cassava in the Ivory Coast. I. Preliminary observations on necrosis of the tips.]—*Rev. Path. vég.*, 29, 1–2, pp. 3–9, 2 pl., 1950.

In the Ivory Coast the most common and injurious disease of cassava, after mosaic, is tip necrosis or die-back, usually caused by *Colletotrichum manihotis* [*R.A.M.*, 26, p. 219], the setiferous form of *Gloeosporium manihotis* [ibid., 24, p. 138]. Occasionally a perfect state common to the two kinds of acervuli is present, which also developed in culture on Czapek's medium and maize agar from a *Colletotrichum* form taken from a stem canker; it was also found on a dead twig at Abengourou and later in the vicinity of Abidjan. The ascospores of the Abengourou fungus inoculated into a detached twig gave both types of acervuli and new perithecia. On Czapek's medium the perithecia measured 100 to 180 μ in diameter. The tapering, cylindrical, subsessile asci measured 49·6 to 69·5 by 10·6 to 12·2 μ. The hyaline, unicellular, slightly curved ascospores measured 15 to 20·9 by 4·9 to 6 μ. In the Abidjan specimen the perithecia measured 84 to 160 μ in diameter, and the cylindrical, sessile or subsessile asci 64·4 by 11·5 (54·7 to 72·4 by 9·8 to 14·4) μ. The hyaline, entire, straight or slightly curved ascospores had a maximum diameter in the median part and measured 16 by 4·9 (14 to 19·4 by 4·8 to 6·3) μ; when curved they showed unequal dorsal and ventral curvatures. These characters are close to those of *Glomerella cingulata*, but the author was unable to infect banana with the cassava fungus or cassava with *Gloeosporium musarum*. The name *Glomerella manihotis* n.sp. [without a Latin diagnosis] is proposed, therefore, for the perfect state.

Peyronel (B.). **Sull' arricciamento o degenerazione infettiva della Vite. Osservazioni e rilievi critici fatti in occasione delle 'giornate di studio del court-noué' (Francia, 25 giugno–2 luglio 1947.)** [On leaf roll or infectious degeneration of the Vine. Observations and critical remarks made during the 'sessions on the study of court-noué' (France, 25th June–2nd July, 1947).]—Reprinted from *Ann. Accad. Agric. Torino*, 90, 17 pp., 1947–48. [Received July, 1950.]

At the Conference in 1947 of the International Wine Commission for the study of court-noué [*R.A.M.*, 29, p. 348; 30, p. 137] the author suggested that the course of the disease in American vines grafted to European stocks should be investigated in vineyards unaffected by *Phylloxera*, to establish whether the same virus is responsible for damage incurred in the nurseries of American vines and in vineyards established on diseased American stocks. It would also be advisable to graft American vines, such as Rupestris [ibid., 29, pp. 137, 246], which are especially susceptible to the condition, on to apparently healthy European stocks to see whether these are carrying a masked virus. He also suggested grafting fragments of tissues from infected vines to healthy plants. The Italian delegation also urged the Commission to consider employing the test of the endocellular cordons as a means of distinguishing with certainty affected vines and for controlling the introduction of American vines. The author, however, regards this

method as being very unreliable in the first stages of disease and especially with Berlandieri and Riparia vines, since many sections may be made before any cordons are found.

TAVADZE (P. G.). **Biochemistry of Grape chlorosis.**—*Vinod. i Vinograd., S.S.S.R.*, 8, 8, pp. 30–31, 1948. [Abs. in *Chem. Abstr.*, 44, 20, p. 9521, 1950.]

Amylase activity in Khirsa vine leaves was much higher in those suffering from virus chlorosis [cf. *R.A.M.*, 25, p. 201; 27, p. 216] than in healthy leaves. It may, therefore, be assumed that the virus causes premature ageing of the plant with resultant increase in amylase content. Total salt and water contents were higher in chlorotic than in healthy leaves and titratable acid and the assimilation rate higher in the latter.

HYAMS (E.). **Fungus diseases and Grape-Vines.**—*Gdnrs' Chron.*, Ser. 3, 129, 3339, pp. 4–5, 1951.

During 1950, vines growing at Canterbury, Kent, were purposely left unprotected from disease. *Uncinula necator* [*R.A.M.*, 14, p. 9] developed seriously in July on one block of Gamay hâtif des Vosges, attacking every plant the growth and vigour of which were below average, together with two rows known to be affected by magnesium deficiency [ibid., 28, p. 438]. Anthracnose [*Elsinoe ampelina*: ibid., 29, pp. 287, 494] appeared in August, and was confined to a few vines in a block of 100 Seyne-Villard 5276. After one of the wettest Augusts recorded mildew (*Peronospora* [*Plasmopara*] *viticola*) [ibid., 28, p. 473] became general. The strongest plants of the most susceptible varieties were seldom or slightly affected, while weaklings were severely attacked. Every variety of *Vitis vinifera* became infected, Pinot Meunier very slightly and Pinot Noir very badly; Madeleine Royale and Gamay hâtif des Vosges on mature, well drained loam were hardly touched, whereas on undrained heavy clay they were severely affected. Grafted vines were more resistant than those on their own roots. At Oxted Research Station serious outbreaks of mildew occurred in spite of preventive treatments. Seyne-Villard 5276 and Golden Chasselas are stated to be very resistant to [unspecified] fruit moulds [cf. ibid., 10, p. 358], though Madeleine Royale is highly susceptible.

All the American vines, even weak plants, remained unaffected by every disease, as did Baco No. 1, Ravat 6, and Brant. Seibel 5044, though planted in bad soil, appeared to resist *P. viticola* and *U. necator*.

Nyah-Woorinen Enquiry Committee—Annual Report.—*J. Dep. Agric. Vict.*, 48, 10, pp. 467–478, 5 figs., 3 graphs, 1950.

On p. 477 of this report on dried fruit production C. R. MILLIKAN states that in 1950 preliminary spray trials were carried out in the Nyah-Woorinen area, Victoria, for the control of [unidentified] mould on Sultana grape vines [cf. *R.A.M.*, 29, p. 570]. There was no evidence of mould damage at the time of spraying in February. The bunches were left on the vines until moulds developed. In May the vine stems sprayed with dithane Z-78 were healthy, while those sprayed with the zerlate and nomersan were withered and the berries dropped.

A species of *Phytophthora* has been isolated from dying vines in the Red Cliffs area. Pathogenicity tests are in progress.

NICKELL (L. G.) & BURKHOLDER (P. R.). **Atypical growth of plants. II. Growth in vitro of virus tumors of Rumex in relation to temperature, pH, and various sources of nitrogen, carbon, and sulphur.**—*Amer. J. Bot.*, 37, 7, pp. 538–547, 10 graphs, 1950.

In further experiments at the Brooklyn Botanical Garden and the Yale University

Osborn Botanical Laboratory [cf. *R.A.M.*, 28, p. 507], the optimum temperature for the growth *in vitro* of root wound tumour tissue induced by *Aureogenus magnivena* [clover big vein virus] was 21° to 25° C., the growth rate being approximately equal in light and in darkness. Sucrose, glucose, levulose, and soluble starch were the best sources of carbon. Starch utilization appears to be due to the secretion of an extracellular enzyme. Pyruvic acid inhibited growth, in proportion to the amount of acid present, at all levels tested. Sulphate, bisulphite, and cysteine were excellent as sole sulphur sources; nitrate was the best source of nitrogen. Low pH values increased nitrate utilization. At optimum nitrate concentration aspartate increased growth in proportion to the amount added. The importance of aspartate in the metabolism of the virus tumour tissue is discussed.

Black (L. M.). **A plant virus that multiplies in its insect vector.**—*Nature, Lond.*, 166, 4229, pp. 852–853, 1950.

In an experiment on the transmission of clover club leaf virus, carried on for over five years [*R.A.M.*, 27, p. 239], 21 generations of the insect vector *Agalliopsis novella* were reared entirely on immune Grimm lucerne without loss of infectivity. It was calculated that the dilution of the original clover club leaf virus, assuming no multiplication in the insects, would exceed at a very conservative estimate $1:2{\cdot}8\times10^{26}$. It appears conclusive, therefore, that the virus must have multiplied in the vector [cf. ibid., 28, p. 589] during the experimental period.

Bawden (F. C.). **The multiplication of viruses.**—*Sci. Progr.*, 39, 153, pp. 1–12, 1951.

The author briefly reviews and discusses current opinions on the multiplication of viruses [see preceding abstract] with special reference to work on bacterial, animal, and plant viruses, particularly the tobacco mosaic virus. The first part deals with dissimilarities between viruses and intracellular micro-organisms and proteolytic enzymes. Present knowledge clearly shows that infection imposes a new metabolic pattern on cells and directs synthesis into new channels, which causes the production of replicates of the infecting particle and a variety of other products that resembles these particles to different extents. An account is given of the initiation of infection, the latent period, and the varieties of end-products. There is growing evidence that virus multiplication does not lead to a single end-product, though the status of the non-infective particles is uncertain. They may, perhaps, be examples of faulty synthesis or assembly; they may be intermediates in the assembly of virus particles; or they may be degradation products from previously infective particles. The causation of disease may be irrelevant to virus multiplication and may depend on side reactions between groups specific to individual virus strains and host-cell components.

Hill (A. V.) & Helson (G. A.). **Distribution in Australia of three virus diseases and of their common vector Orosius argentatus (Evans).**—*J. Aust. Inst. agric. Sci.*, 15, 3–4, pp. 160–161, 1 map, 1949.

The distribution of yellow dwarf virus disease of tobacco [see above, p. 199] in Australia has been determined so far only by its occurrence on tobacco and is present mainly in the south east. Virescence (big bud virus) of tomato occurs on tobacco, tomato, and other species in all the Australian States [ibid., 28, p. 252; 30, p. 18] except Tasmania where it has been observed only on plants other than tobacco and tomato. Witches' broom virus of lucerne [ibid., 26, p. 61] occurs in all States except Tasmania. The insect vector, *Orosius argentatus* (formerly *Thamnotettix argentata*) is widely distributed and is present in every State and the Australasian islands, though not apparently in New Zealand.

Vanderwalle (R.). **Observations et recherches effectuées à la Station de Phytopathologie de l'État pendant l'année 1949.** [Observations and researches carried out at the State Phytopathological Station during the year 1949.]—*Bull. Inst. agron. Gembloux*, 18, 1–2, pp. 179–189, 1950.

In this report on plant diseases in Belgium in 1949 [cf. *R.A.M.*, 29, p. 604] it is stated that *Cercosporella herpotrichoides* [loc. cit.] was moderately prevalent on wheat, barley, and winter barley. *Puccinia triticina* [ibid., 17, p. 226] was general and intense on some wheat varieties. *P. simplex* [*P. hordei*: cf. ibid., 29, p. 142] developed markedly on barley and winter barley at the end of June. Barley loose smut (*Ustilago nuda*) tended to be less prevalent. There were occasionally severe attacks of celery 'rust' [*Septoria apii*: cf. ibid., 30, p. 19], which has increased. Heavy losses to beets were caused by *Pythium debaryanum* [ibid., 29, p. 343] and boron deficiency; virus yellows [ibid., 30, p. 91] was more abundant than in 1948. A virus disease of catch-crop turnips, consisting of a yellowing apparently not transmitted to other *Brassicae* in the vicinity, caused 50 per cent. reduction of crops when severe. *Venturia inaequalis* [ibid., 26, p. 306] remains an important parasite of apples in Belgium. Rhine disease [*Valsa leucostoma*: cf. ibid., 15, p. 447] and *Gnomonia erythrostoma* [cf. ibid., 29, p. 104] have increased on cherry trees. *Dothichiza populea* [ibid., 25, pp. 153, 586] was rather virulent on poplar, and *Gloeosporium nervisequum* [*Gnomonia veneta*: ibid., 27, p. 396] severely attacked the leaves of plane trees [*Platanus* spp.] in the spring.

Plant diseases.—*Agric. Gaz. N.S.W.*, 61, 9, pp. 465–467, 3 figs., 1950.

In most seasons the chief cause of loss to poppy crops in New South Wales is due to the tomato spotted wilt virus [*R.A.M.*, 17, p. 730; 28, p. 512]; some strains of Iceland poppy [*Papaver nudicaule*] appear to be relatively tolerant. Downy mildew (*Peronospora arborescens*) [ibid., 13, p. 445; 29, p. 404] is serious only in very humid weather, when plants still in the seed bed should be sprayed with Bordeaux mixture (1–1–20) at intervals of ten to 14 days. For protection against crown rot (*Phytophthora cryptogea*) [ibid., 6, p. 669; 18, p. 373] poppies should be grown in well-drained soil and should not be planted in infested land more often than once in four years.

New diseases recorded in New South Wales during the six months ending 30th June, 1950, include *Cladosporium* [*Fusicladium*] *carpophilum* on almond [cf. ibid., 19, p. 69], yellow spot (tomato spotted wilt virus) of pineapple [ibid., 29, p. 160], *Phytophthora cinnamomi* causing collar and root rot of *Azalea indica* [*Rhododendron indicum*: ibid., 29, p. 497], *P. cactorum* on *Rhododendron* sp., *Septoria betae* on silver beet, *S. paeoniae* on peony, *S. vignae* on cowpea, *Fabraea maculata* on *Crataegus oxyacantha*, *Mycosphaerella citrullina* on pumpkin (*Cucurbita maxima*) [ibid., 28, p. 615], *Sclerotinia homoeocarpa* on *Cynodon dactylon*, [tomato] big bud virus on *Digitalis purpurea*, geranium [*Pelargonium*], *Physostegia virginiana*, *Salvia reflexa*, and *Zinnia elegans*, *P. palmivora* causing fruit rot of fig, bean mosaic virus on *Hardenbergia monophylla*, *Macrophomina phaseoli* causing tomato stem rot, *Pseudomonas matthiolae* on *Matthiola incana* [cf. ibid., 18, p. 257], and *Coccomyces hiemalis* on sweet cherry.

Science for the Farmer.—*Rep. Pa agric. Exp. Sta., 1949–50* (*Bull.* 529), 60 pp., 22 figs., 1 diag., 1950.

It is stated in this report [cf. *R.A.M.*, 29, p. 291] that the maize hybrid Ia. B8 has been improved in agronomic characteristics, the new selections showing practically no symptoms of magnesium deficiency [ibid., 14, p. 645].

A potato variety 2XJ-1, resistant to blight [*Phytophthora infestans*], bred by W. R. Mills may replace Russet Rural as a chipping variety.

According to C. L. Fergus, a new and virulent disease of burr oak [*Quercus macrocarpa*] in Pennsylvania is caused by *Strumella coryneoidea* [ibid., 27, p. 502]. Consideration should be given to the removal of infected trees from adjacent stands before susceptible species are planted. There is a possibility that supposedly resistant trees may prove susceptible when grown in plantations, as has been found with burr oak.

E. O. Schneider and W. S. Beach report that two tobacco lines resistant to wildfire [*Pseudomonas tabacum*: ibid., 29, p. 292], bred at the Research Laboratory, Lancaster, compared favourably in 1949 with the susceptible variety Swarr-Hibshman. They flowered two days later than Swarr-Hibshman and also matured three days later, but leaf size, shape, and the number of leaves were the same. Carnation wilt [*Verticillium cinerescens*: cf. ibid., 29, p. 606] was reported in Pennsylvania for the first time in 1949 from Beaver, Chester, and Columbia counties and caused much damage. Dutch elm disease [*Ceratostomella ulmi*: ibid., 27, p. 64] appears to be more serious and is now known from Lancaster, Mercer, Berks, Luzerne, Montour, Montgomery, Northampton, Chester, and Philadelphia counties.

Lucerne bacterial wilt [*Corynebacterium insidiosum*: ibid., 29, p. 109] is becoming more prevalent and is reported over widespread areas in several counties. The report of *Verticillium* wilt [*V. albo-atrum*: ibid., 29, p. 407] of potatoes in Lehigh county in 1949 was the first record for the State, but is thought probably to have been present previously. Jelly end rot (*Fusarium* spp. and other fungi) [ibid., 3, p. 476] was prevalent in 1949.

Mata Quesada (E.). **Principales enfermedades y plagas en los cultivos más comunes de la Meseta Central.** [Principal diseases and pests in the more commonly cultivated crops of the Central Meseta.] —*Suelo Rico*, 4, 21–22, pp. 198–214, 1950.

Descriptive notes are given on the common pathogens of coffee, potato, maize, vegetables, fruits, and flowers on the central plateau of Costa Rica, with directions for their control, including *Bacterium* [*Xanthomonas*] *solanacearum* [C.M.I. map No. 138] and *Corynebacterium sepedonicum* [C.M.I. map No. 20] on potato; *Colletotrichum lindemuthianum* on bean [*Phaseolus vulgaris*: C.M.I. map No. 177], *Peronospora schleideniana* [*P. destructor*: C.M.I. map No. 76] and species of *Phytophthora* and *Pythium* on onion; *Phytophthora parasitica* causing gummosis of citrus; mildew (*Erysiphaceae*) [? *Oidium mangiferae*] on mango; *Taphrina deformans* on peach [C.M.I. map No. 192]; *Sphaerotheca pannosa* and *Diplocarpon rosae* on rose; *Septoria chrysanthemi* on *Chrysanthemum*; and *S. gladioli* on *Gladiolus*.

Hildebrandt (A. C.). **Some important galls and wilts of plants and the inciting bacteria.**—*Bact. Rev.*, 14, 3, pp. 259–272, 1950.

Most of the 70 papers forming the basis of the present survey of the available information on a number of important plant galls and wilts of bacterial origin [cf. *R.A.M.*, 29, p. 632] have been noticed from time to time in this *Review*.

Blass (Judith) & Manigault (P.). **Étude biochimique des tumeurs de crown-gall chez Pelargonium zonale. Étude des glucides.** [A biochemical study of crown gall tumours in *Pelargonium zonale*. Study of the glucides.]—*Ann. Inst. Pasteur*, 79, 1, pp. 60–71, 4 figs., 1950.

A comparative study of crown gall and healthy tissues in *Pelargonium zonale* plants inoculated with *Agrobacterium* [*Bacterium*] *tumefaciens* [*R.A.M.*, 27, pp. 9, 536] revealed the following differences. The diseased tissues contain larger quantities of nitrogen and phosphorus, fewer hemicelluloses, and relatively more pectic substances than healthy ones. Starch is absent from the former even when abundant in the latter. Chromatograms disclosed marked differences in the proportions of the various sugars in the two locations.

Thornberry (H. H.), Braun (A. C.), & Elrod (R. P.). **Application of the bacteriophage-lysis technique for the identification of plant pathogenic bacteria.**—*Phytopathology*, 39, 2, pp. 152–153, 1949.

The following procedure was used in tests at the Illinois Agricultural Experiment Station and the Rockefeller Institute for Medical Research for the evaluation of the lytic potency of *Xanthomonas pruni* bacteriophage [*R.A.M.*, 28, p. 221] on a number of *Xanthomonas* species, including plant pathogens. Two young cultures (24 to 48 hours' growth in 5-ml. broth tubes at pH 7·2 to 7·4 containing 0·2 per cent. glucose) were each inoculated with 0·5 ml. *X. pruni* phage and agitated for mixing. The cultures and an uninoculated control were then incubated for 12 to 24 hours at 22° to 24° C. and their relative turbidity observed at intervals. Lysis, demonstrated by a relative decrease of turbidity on stirring, occurred only in the six isolates of *X. pruni* used, and is thus a specific function of its bacteriophage. Three other species grouped with *X. pruni* on a serological basis [ibid., 26, p. 383] showed no evidence of lysis. The phage-lysis method would appear to hold promise as a general identification procedure if highly specific phages for other pathogens can be found and preserved.

Annual Report West African Cacao Research Institute. April, 1948 to March, 1949.—64 pp., 1950.

It is stated in the virus research section (pp. 12–28) of this report [cf. *R.A.M.*, 27, p. 515] that a new cacao virus (1R) [see next page] has been transmitted to test plants at Tafo from budwood collected in June, 1948, from infected trees at Alaparun, Nigeria [ibid., 30, p. 23]. The virus is transmissible by *Pseudococcus njalensis*. In the acute phase it causes a red pigmentation over the whole lamina. Small transparent lesions develop which may become necrotic and resemble those of the Asalu virus (1S) [ibid., 29, p. 144]. No other cacao virus shows any close relationships to either virus 1C or 1M [ibid., 29, p. 608]. Recent work has shown that the viruses are transmissible from the testae of seeds developing on diseased trees. Seeds were taken from immature pods infected with virus 1A and the embryo and mucilage removed. Mealy bugs (*P. njalensis*) were placed in the cavities of 13 testae and after two days transferred to 37 beans. Three cases of virus transmission were obtained from two testae. Further experiments have again demonstrated the decreased transmission rate from symptomless leaves of seedlings infected with attenuated virus 1A. Except during a short acute phase and occasional symptom recurrences, such seedlings are symptomless. It is suggested that attenuated virus 1A is almost unavailable to vectors fed on leaves or stems of symptomless flushes. In trials of 58 cuttings of local yield selections of Trinitario and Amelonado types for resistance to 1A, rates of infection varied from 10 to 100 per cent. In a second resistance trial progeny from Nanay × Papinari had a mean rate of infection of 3·85±0·85 out of 20 and Amelonado controls 8·7±0·83. The spread of virus 1A in the demonstration area each year from August, 1945, to August, 1948, was 31, 46, 64, and 80 per cent., respectively, and by March, 1949, 85 per cent. of the trees were diseased. Seedlings in replanted areas are making good growth, ten being infected. *Erythropsis barteri* is recorded as another host of cacao viruses [loc. cit.]. Field collections have shown that vector dominance on cacao is of the order of *P. njalensis* 200, *P. citri* 1·5, and all other mealy bug species 0·5; that virus vectors are essentially arboreal feeders and occur in their greatest numbers in the canopy layer of the host tree [ibid., 28, p. 163]; and that vector dispersal is brought about by wind, ant assistance, individual initiative, and by man.

In the mycology section (pp. 48–51) it is reported that pod-spraying at weekly intervals with Bordeaux mixture, perenox, and nicotine sulphate did not affect the ratio of number of pods per pound of wet beans for the 1948 main crop. Bordeaux

reduced the incidence of black pod (*Phytophthora palmivora*) [ibid., 27, p. 537; 29, p. 356] to 4·5 per cent. compared with 12·5 for the unsprayed. Perenox was the best treatment for *Botryodiplodia theobromae* [loc. cit.]. Spraying the canopy of cacao trees to reduce reservoirs of the former fungus is practised in Costa Rica [ibid., 28, p. 564] where the disease is more widespread owing to the heavier rainfall. Germination of the sporangia of *P. palmivora* in hanging drops was mainly by germ tubes [cf. ibid., 29, p. 389]. On 12 $\frac{1}{4}$-acre plots at Tafo *B. theobromae* infection varied from 28 to 81 per cent. (mean 61) in 1948 contrasted with 5 to 73 (mean 38) in 1947. The percentages of warty pods in the two years were 3·5 and 7·7. *Calonectria rigidiuscula* [ibid., 27, p. 516] occurs fairly frequently on rotting cacao pods still on the tree where macroconidia are formed in abundance. Fructifications on cacao wood are uncommon. The fungus was isolated from infected capsid lesions on cacao shoots collected in Sierra Leone.

Posnette (A. F.) & Robertson (N. F.). **Virus diseases of Cacao in West Africa. VI. Vector investigations.**—*Ann. appl. Biol.*, 37, 3, pp. 363–377, 1 graph, 1950.

In further work at the West African Cacao Research Institute [cf. *R.A.M.*, 29, p. 607 and preceding and next abstracts], the infection rate of cacao beans with cacao swollen shoot viruses 1A and 1M was increased to 95 per cent. when the number of *Pseudococcus njalensis* insects per test plant was increased to 25. Adults of *P. citri*, chosen because they were easier to establish on leaves than *P. njalensis*, effected 47 per cent. transmission while first and second instar nymphs accomplished 29 per cent. Few insect transmissions of virus 1C were obtained from mature trees or from seedlings infected with 1C for over a year, but they were readily obtained from freshly infected seedlings. Immature leaves with the red-veining symptom provided the best source of 1M, 19 infections being obtained compared with 10, 9, and 3 infections from leaves with a total mosaic pattern, preliminary pattern, and symptomless, respectively. Slight differences in the maturity of the leaves of the source plants can lead to considerable variation in infection rate.

Normal infection rates with 1M were obtained from 22 feeding sites on different parts of the plant but no transmission was obtained from three petioles and one stem, indicating virus localization. *P. njalensis* nymphs were estimated to take about 16 minutes to penetrate plant tissue with their stylets.

Infection rates increased with increasing test feeding time up to 50 minutes. The 1M virus was non-persistant in the feeding insect but persisted up to 36 hours in insects starved after the infection feed. The infection rate was increased by starvation before infection feeds of up to 10 hours. After this the rate with pre-starved insects declined to the level of unstarved insects.

Posnette (A. F.). **Virus diseases of Cacao in West Africa. VII. Virus transmission by different vector species.**—*Ann. appl. Biol.*, 37, 3, pp. 378–384, 1950.

In further work on swollen shoot of cacao in West Africa [see preceding abstracts], the following viruses, some probably strains, were selected: viruses 1A, C, D, F, H, J, K, and M from the Gold Coast, N, O_1, O_2, O_3, P, R, and S from Nigeria [loc. cit.], and X and Y from the Ivory Coast [*R.A.M.*, 29, p. 252]; and 13 species of the Coccoidea were tested as vectors. *Pseudococcus njalensis*, *P. citri*, *P. bukobensis*, and *P.* sp. near *celtis* have transmitted all but one of the viruses with which they have been fully tested. *Paraputo ritchiei*, *Phenacoccus* sp. (6418), *Pseudococcus brevipes*, *P.* sp. near *gahani*, and *P.* sp. near *masakensis* have each transmitted one or more viruses. *P. longispinus* has transmitted viruses 1C and 1M and none of the others, while *Ferrisia virgata* transmitted all except 1C, 1M, 1D, 1R, and 1S except in one experiment with 1M. The latter insect, when fed on plants infected with 1A and 1M and others infected with 1R and 1A, transmitted only 1A. No vector was found for virus 1S.

It is suggested that non-transmitting strains of *P. njalensis* are uncommon in the Tafo district. A strain of *P. citri* cultured from a single gravid female from Tafo failed to transmit under conditions suitable for transmission by the mixed progeny of five female *P. citri* collected at Kpeve.

It is stated that control measures should be directed against the Pseudococcidae as a group. It is important to control outbreaks of 'mild' viruses because complexes formed when plants become infected with two or more viruses would be spread simultaneously as a complex by the common vectors. The bearing of these findings on the classification of cacao viruses is considered.

Varieties of winter Wheat. Recommended list.—*Fmrs' Leafl. nat. Inst. agric. Bot.* 8, 4 pp., 1950.

Of the winter wheat varieties briefly described in this recommended list (revised up to August, 1950), for cultivation in Great Britain, Little Joss and Steadfast are highly resistant to yellow rust [*Puccinia glumarum*: *R.A.M.*, 29, p. 609] while Staring [ibid., 30, p. 147] remained almost free from loose smut [*Ustilago tritici*] during three years' preliminary trials.

Mitchell (J. E.), Hotson (H. H.), & Bell (F. H.). **The use of sulfanilamide derivatives as eradicant fungicides for Wheat stem rust.**—Abs. in *Phytopathology*, 40, 9, p. 873, 1950.

When sulphanilamide and several of its derivatives were tested as foliar sprays for the control of wheat stem rust [*Puccinia graminis*], sulphadiazine proved to be more effective than sulphapyridine, sulphanilamide, sulphathiazole, and sulphamerazine. The minimum concentration necessary to inhibit pustule development on the inoculated leaves was 0·1 per cent. of the sodium salt. The use of a wetting agent and a few hours' maintenance of the plants in a moist chamber after treatment enhanced the efficacy of the compounds. At 0·4 per cent. sulphadiazine retarded the growth of the plants. The compounds appear to inhibit mycelial development, no lesions, or at most only flecks, being apparent at the optimum dosages. Used at subphytotoxic levels, amate and other phytotoxic chemicals prevented rust development in the leaves.

Clark (J. A.). **Registration of improved Wheat varieties.**—*Agron. J.*, 42, 8, pp. 408–409, 1950.

Since the publication in 1945 of the last report on the registration of improved wheat varieties [*R.A.M.*, 24, p. 308], a further five have been approved, namely, hard red winter Westar (Reg. No. 340), resistant to leaf [brown] rust [*Puccinia triticina*], soft red winter Blackhawk (Reg. No. 341) and Austin (Reg. No. 342), the former resistant to several diseases, including brown rust, and the latter highly resistant to stem rust [*P. graminis*] and loose smut [*Ustilago tritici*] and moderately so to some races of brown rust; hard red spring Cadet (Reg. No. 343) [see next abstract], intermediate in its reactions to brown rust and bunt [*Tilletia caries* and *T. foetida*], Saunders (Reg. No. 344) [ibid., 29, p. 495], and White Cascade (Reg. No. 345) [ibid., 27, p. 11].

Fletcher (D. G.). **Stem rust on Wheat and Oats in the Dakotas and Minnesota.**—*Plant Dis. Reptr*, 34, 10, pp. 316–318, 1 map, 1950. [Multilithed.]

In this abstract from the report of the Conference for the Prevention of Grain Rust, held at Minneapolis, August–September, [1950], is stated that in August black rust (*Puccinia graminis*) [*R.A.M.*, 29, p. 357] became epidemic on wheat and oats throughout the eastern half of the Dakotas and western Minnesota. All varieties of durum wheats, including red durum (D5), were susceptible to at least one of the races present, and in September losses amo unted to 40 per cent. Race 15 and its

more virulent biotype 15B [ibid., 26, p. 298; 28, pp. 328, 623; 29, pp. 150, 495] were identified in the south-western winter wheat States as well as on wheat near barberries in the east, and because the resistant varieties such as Stewart, Carleton, Nugget, red durums, Mida, Redman, Lee, and Cadet [see preceding abstract] were attacked, it is suggested that race 15B has spread to the north. This race, now independent of barberry, will probably in future take part in the wind-blown rust migration. In the autumn of 1950 susceptible grasses and volunteer grains between the Dakotas and Minnesota and southern Texas or northern Mexico [ibid., 30, p. 150] will provide favourable carry-over hosts on the southward journey. The reason for the relatively small losses in bread wheats (2 to 3 per cent. in North Dakota) is that the grain matured just ahead of the rust.

Oats escaped severe losses from combined attacks of black rust and crown rust (*P. coronata*) [ibid., 29, p. 612; 30, p. 32] because they ripened early. Races 7 and 8 of black rust and race 45 of crown rust were widespread, and there are no commercial varieties which are resistant to all three races.

Briggs (F. N.) & Holton (C. S.). **Reaction of Wheat varieties with known genes for resistance to races of bunt, Tilletia caries and T. foetida.**—*Agron. J.*, 42, 10, pp. 483–486, 1950.

One of the most important advances in the study of physiologic specialization in *Tilletia caries* and *T. foetida* [*R.A.M.*, 30, p. 29] within the last 25 years has been its practical application as a working tool for the wheat-breeders of the United States. The use of a single race of *T. caries* for testing purposes has been of great value in the wheat-breeding programme of the University of California, Davis, where Briggs and his collaborators have identified four major and two minor genes for resistance to the disease [ibid., 20, p. 457]. Since it seemed probable that this procedure, coupled with that of using many races, would be advantageous for the discovery of additional genes for bunt resistance and in the effective development of resistant varieties, the studies herein described and tabulated were carried out to ascertain the reaction of 12 varieties, for which the genes for resistance were determined in California, to 25 races of bunt at the Washington Agricultural Experiment Station.

For the most part, the five varieties which have been shown to possess only the Martin genes, *M*, for resistance, viz., Martin, C.I. 4463; White Odessa, C.I. 4655; Sherman, C.I. 4430; Banner Berkeley, C.I. 7362; Odessa, C.I. 4473; and Hussar, C.I. 4843, reacted uniformly to the different races. Exceptions were races T-13, T-14, L-9, to which Martin and Odessa were resistant but the other varieties were susceptible. Selection 1403, which carries the *H* gene extracted from Hussar, behaved according to expectation except with regard to T-5 and L-5, where the results were conflicting. The resistance previously reported of this variety to these two races was not maintained, and the situation requires clarification.

The Turkey (*T*) and Rio (*R*) genes are very closely linked and were virtually identical in their responses to all the races used in the tests. Turkey, C.I. 10015, carries two weak factors (*XXYY*) for resistance to bunt. The *Y* gene was postulated to reduce infection to 45 per cent. and the *X* to 22·5. Acting together these two genes produced a high degree of resistance in the Californian experiments, but in Washington Turkey developed 36·1 per cent. infection when inoculated with the same race, T-1.

The *M* and either the *T* or *R* genes together confer resistance to all 25 races of bunt and also to dwarf bunt [ibid., 29, p. 295; 30, p. 30]. Hence in the development of varieties resistant to all these races the plant-breeder need be concerned with only two major genes, *T* and *M*, which are carried by any one of several varieties. His hybrid stock, moreover, need be tested against only two races, since either T-16 or L-8 will serve as an indicator for the *M* gene and any one of the others for

T or *R*. Thus, there would seem to be a simple solution to the problem of varietal development as far as the known bunt races are concerned. For instance, Selection C.I. 12242 of Rio × Rex, which is believed to combine the *R* and *M* genes, is resistant to all 25 races. The resistance of Rex was inherited from White Odessa.

PATEL (M. K.), DHANDE (G. W.), & KULKARNI (Y. S.). **A modified treatment against loose smut of Wheat.**—*Curr. Sci.*, 19, 10, pp. 324–325, 1950.

The authors' modification of the solar heat method for the control of wheat loose smut (*Ustilago tritici*) involves soaking the seed in water at room temperature from 8 a.m. to noon and then spreading it in a thin layer on galvanized iron sheets in the sun for 1½ to 2 hours, stirring once or twice to maintain contact between the seed and the hot surface. At the end of the period of exposure the temperature of the seed was found to range from 130° to 133° F. This procedure has two advantages over Vasudeva and Iyengar's [*R.A.M.*, 29, p. 555], one being that it does not require a brick floor and the other its applicability in peninsular India, where the temperatures are lower than in the north. Absolute control of *U. tritici* was obtained by the 1½ or 2 hours' exposure in four localities of Bombay, while one hour's treatment permitted the development of up to 0·13 per cent. infection, as compared with 3·6 to 6·2 per cent. in the untreated.

LOWTHER (C. V.). **Pathogenicity of physiologic races of Erysiphe graminis tritici in the southeastern United States.**—Abs. in *Phytopathology*, 40, 9, p. 872, 1950.

Wheat powdery mildew (*Erysiphe graminis*) has become increasingly prevalent of recent years in the south-eastern United States, where varieties previously resistant have contracted infection, denoting the presence of new physiologic races in the area [*R.A.M.*, 28, p. 388]. From 40 collections of the pathogen obtained in 1948 and 1949 nine races were differentiated on Axminster C.I. 8195, Ulka C.I. 1478, Chul C.I. 2227, Hope C.I. 8178, and Normandie C.I. 12747. Eight were collected within a 70-mile radius of Beltsville, Maryland, while the ninth originated near Winston-Salem, North Carolina. All the commercial varieties grown in the south-east are susceptible in varying degrees to one or more of the above-mentioned races, but a few highly resistant non-commercial wheats are available for breeding [ibid., 29, pp. 142, 495].

TAPKE (V. F.). **Flaccidity, turgidity, and predisposition in Barley and Wheat as factors in susceptibility to powdery mildew (Erysiphe graminis DC.).**—Abs. in *Phytopathology*, 40, 9, pp. 873–874, 1950.

Recent experiments have shown that when susceptible barley and wheat varieties are inoculated with powdery mildew (*Erysiphe graminis*) and then exposed to conditions favouring infection, the attack (on plants beyond the seedling stage) may range from practically nil to 100 per cent., depending on how the plants were conditioned by their pre-inoculation environment [cf. *R.A.M.*, 23, p. 292]. Thus, plants grown in the greenhouse or under conditions promoting a tender, succulent habit are more susceptible than those toughened by keeping outdoors. The writer, in contrast to Rivera [cf. ibid., 12, p. 715], finds flaccid and turgid plants equally susceptible, and attributes Rivera's results to the use of plants differently preconditioned by environment before inoculation, i.e., hardened by outdoor or softened by indoor growth.

WINTER (A. G.) & RÜMKER (ROSMARIE v.). **Die Mikroflora der Rhizosphäre als resistenzbestimmender Faktor.** [The microflora of the rhizosphere as a factor in the determination of resistance.]—*Arch. Mikrobiol.*, 15, 1, pp. 72–84, 5 figs., 1950.

This is an expanded version of an account already published [*R.A.M.*, 29,

p. 409] of the writers' studies on the microflora of the rhizosphere [see following abstract] in relation to the resistance of wheat and maize to *Ascochyta pinodella* and *Fusarium culmorum*.

WINTER (A. G.). **Untersuchungen über die Ökologie und den Massenwechsel bodenbewohnender mikroskopischer Pilze. I. Die Bedeutung organischer Nährstoffe für die Entwicklung von Ophiobolus graminis in der Rhizosphäre und im freien Boden.** [Studies on the ecology and mass alternation of soil-inhabiting microscopic fungi. I. The importance of organic nutrients for the development of *Ophiobolus graminis* in the rhizosphere and in free soil.]—*Arch. Mikrobiol.*, 15, 1, pp. 42–71, 11 graphs, 1950.

The reliability of the author's method for the quantitative determination of fungal growth in natural soils [*R.A.M.*, 27, p. 123] was tested in studies at the Phytopathological Institute, University of Bonn, on the function of organic nutrients in the development of the wheat root rot fungus (*Ophiobolus graminis*) in the rhizosphere [ibid., 30, p. 32, and preceding abstract] and in 'free' soil. The deviation of the values in natural soils is slight, but in fortnightly replications of the tests at different times under identical conditions in loess clay and compost desultory growth increases were observed, suggesting a correlation with meteorological influences of an unknown kind [cf. ibid., 29, p. 326].

The correlation regularly observed between nutrient content (peptone, glucose, and biomalt, all ranging from 0·5 to 5 per cent.) and growth of *O. graminis* on sterile media was modified to some extent, especially by antibiotic factors, in non-sterile pure sand, biomalt greatly increasing growth and peptone decreasing it. In sterile compost and loess clay the transformation was intensified, through the strengthening or weakening of antibiotic processes, into a curve of inconstant, erratic course.

Investigations on the action of nutrients in the rhizosphere as compared with the 'free' soil showed that in sand the former is largely protected against influences emanating from the soil. In compost and loess clay, too, the effects produced by nutrients in the rhizosphere are partially opposed to those operating in the 'free soil'.

LEUKEL (R. W.). **Seed treatment tests on Oats and Barley in 1950.**—*Plant Dis. Reptr*, 34, 10, pp. 314–315, 1950. [Multilithed.]

The 1950 co-operative seed treatments [cf. *R.A.M.*, 30, p. 101] with nine fungicides on Atlas barley infected with *Helminthosporium gramineum* and Canadian oats infected with *Ustilago avenae* and *U. kolleri* [cf. loc. cit.] were carried out at Beltsville, Maryland, St. Paul, Minnesota, Fargo, N. Dakota, and Pullman, Washington. The viability of the treated seed was not affected by storage at room temperature for six months. Ceresan M, new improved ceresan (both at ½ oz. per bush.), aagrano 48 (1 to 2 oz.), aagrano 250 (½ to 1½ oz.), semenon (2 to 3 oz.), and panogen (1 and 1¼ oz.) completely eliminated the two smuts and stripe. Mercuran A.S. dust (½ to 1 oz.) also controlled oat smut completely but allowed a trace of stripe at ¾ oz. per bush. Mercuran A.L. was less effective in smut control. Ceresan M slurry (½ oz.) completely eliminated stripe, but allowed up to 1 per cent. smut.

KAKEBEEKE (W.). **Kan de warmwaterbehandeling van Zaaigerst verbetered worden?** [Can the hot-water treatment of seed Barley be improved?]—*Jaarbje nat. Com. Brouwgerst*, 12, pp. 50–55, 1948.

The information in this paper on improved methods of hot-water treatment for the control of barley loose smut [*Ustilago nuda*] has already been noticed from another source [*R.A.M.*, 29, p. 206].

Oswald (J. W.) & Suneson (C. A.). **Oat rust urediospores exceed host tissue in cold resistance.**—*Phytopathology*, 40, 9, pp. 875–876, 1950.

The winter of 1948–9 was one of the coldest on record in the Sacramento Valley, California, minimum temperatures from 20° to 32° F. having been recorded on 33 days between 3rd January and 14th February, with a mean minimum during this period of 28·3°. All the above-ground tissues of oat plants were killed, and by 17th February only the teleuto stage of both *Puccinia graminis avenae* and *P. coronata* was present thereon. Late February laboratory inspections of the *P. graminis* sori revealed some uredospores among the teleutospores. Most of the former proved to be viable and capable of initiating new infections. In the same and later tests a few teleutospores were also viable (0·5 and 2 to 3 per cent. in February and March, respectively). On 22nd March the first new uredosori of both rusts were detected in the green tissue, followed on 7th April by the first secondary infections. On 13th April nearly 250 stem rust and 25 crown rust pustules were counted, but thereafter no further increase was noted.

For the first time viable teleutospores of *P. graminis* were encountered in the central valleys of the State. They were also sufficiently chilled for the dormancy of a small percentage to be broken.

Sheals (J. G.). **Observations on blindness in Oats.**—*Ann. appl. Biol.*, 37, 3, pp. 397–406, 1950.

The author concludes that blindness of oats [*R.A.M.*, 19, p. 272], which affects all oat crops in North Wales to some extent, results from adverse physiological conditions probably during early growth. From a survey in 1947 of 18 crops grown at 11 localities direct insect attack is considered unimportant, and no severe fungus infestation was encountered. The average incidence of blindness in the panicles of S84 oat plants grown in an insect-proof glasshouse was 51·3 per cent., damage to spikelets in the lower, upper, and middle thirds of the panicles being 76·7, 19·7, and 3·6 per cent., respectively. Potash and nitrogen applications were not important in reducing the condition. Picton oats exhibited a significantly lower incidence than S172 or S147. Spring and winter varieties averaged 25·9 and 27·7 per cent. blindness, respectively.

Pate (J. B.). **Studies on Helminthosporium maydis and Helminthosporium carbonum leaf-spot diseases of Corn.**—Abs. in *Phytopathology*, 40, 8, p. 790, 1950.

In 1947 a number of inbred maize lines, single and double crosses, and open-pollinated varieties were inoculated in the field with *Helminthosporium maydis* [*Cochliobolus heterostrophus*: *R.A.M.*, 28, p. 231 and next abstract]. The resultant infection was extremely heavy, and the reaction of inbred lines ranged from very resistant to very susceptible. The single crosses were generally resistant and the response of the double crosses and open-pollinated varieties ranged from resistant to moderately susceptible. From these data resistance to *C. heterostrophus* is assumed to be dominant, with more than one factor involved. Since NC37, one of the parent lines of the double cross hybrid Dixie 17, is susceptible to *H. carbonum* race 1 [ibid., 29, p. 361], a programme was initiated in 1946 to breed resistance into this inbred line. It was crossed with several resistant lines and self-fertilization was started after one or two back-crosses to NC37. Segregating populations were inoculated; counts made of the resistant and susceptible plants in 1946 and 1947 suggested that reaction is governed by a single gene pair, with resistance dominant, but in 1948 and 1949 significant deviations from the expected 3 : 1 ration were obtained. A number of resistant NC37-type lines have been recovered.